GEOGRAPHY, RESOURCES & INDUSTRIES

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EDISON ELECTRIC INSTITUTE BULLETIN

APR 1 1944

The American Way is Not the Easy Way W. C. MULLENDORE 97

Reducing Government Questionnaires Through Utility Sub-Committees . . . . . DAVID J. GUY 100

An Appraisal of Farm Electrification Needs ROY E. HAYMAN 103

A Tentative Job Valuation Plan . . . HERBERT M. SHARP 106

Winning Miss Public with Good-Will Advertising KIMBALL I. JACK 109

Artificial Respiration and Mechanical Resuscitators W. R. SMITH 112

Depreciation Accounting as Applied to Public Utilities SAMUEL FERGUSON 113

Future Trends in Cables for Distribution Voltages G. B. SHANKLIN 122

Fundamental Investigation of Graphitization of Piping . . 125

Personals 127

Conventions and Meetings, 128

PUBLISHED MONTHLY BY EDISON ELECTRIC INSTITUTE

THE ELECTRIC LIGHT AND POWER INDUSTRY

Current Statistical Data Covering 100 Per Cent of Industry

Years 1942 and 1943

SOURCE AND DISPOSAL OF ENERGY—ENTIRE YEAR

	1943	1942	%
GENERATION* (Net)			
By Fuel Burning Plants	146,807,140,000	125,001,800,000	+17.4
By Water Power Plants	73,921,160,000	64,179,359,000	+15.2
Total Generation	**220,728,300,000**	**189,181,159,000**	**+16.7**
Add—Net Imports over International Boundaries	1,536,900,000	1,447,900,000	+ 6.1
Less—Company Use	1,653,149,000	2,417,100,000	−31.6
Less—Energy Used by Producer	9,487,945,000	4,193,659,000	+126.2
Net Energy for Distribution	**211,124,106,000**	**184,018,300,000**	**+14.7**
Losses and Unaccounted for	25,234,845,000	24,610,596,000	+ 2.5
Sales to Ultimate Customers	**185,889,261,000**	**159,407,704,000**	**+16.6**

CLASSIFICATION OF SALES

NUMBER OF CUSTOMERS—As of December 31st			
Residential or Domestic	26,872,639	26,620,456	+ 0.9
Rural (Distinct Rural Rates)	1,088,698	1,095,512	− 0.6
Commercial or Industrial:			
Small Light and Power	4,168,245	4,219,457	− 1.2
Large Light and Power	146,593	149,928	− 2.2
Other Customers	120,125	125,087	− 4.0
Total Ultimate Customers	**32,396,300**	**32,210,440**	**+ 0.6**
KILOWATTHOUR SALES—During Year			
Residential or Domestic	28,621,403,000	26,936,773,000	+ 6.3
Rural (Distinct Rural Rates)	2,996,098,000	2,889,853,000	+ 3.7
Commercial or Industrial:			
Small Light and Power	29,071,012,000	27,233,420,000	+ 6.7
Large Light and Power	105,778,286,000	88,378,197,000	+19.7
Street and Highway Lighting	2,075,048,000	2,061,159,000	+ 0.7
Other Public Authorities	9,139,328,000	4,206,069,000	+117.3
Railways and Railroads:			
Street and Interurban Railways	4,649,339,000	4,256,260,000	+ 9.2
Electrified Steam Railroads	2,576,118,000	2,371,734,000	+ 8.6
Interdepartmental	982,629,000	1,074,239,000	− 8.5
Total to Ultimate Customers	**185,889,261,000**	**159,407,704,000**	**+16.6**
Revenue from Ultimate Customers	**$3,077,642,900**	**$2,855,843,000**	**+ 7.8**

RESIDENTIAL OR DOMESTIC SERVICE

AVERAGE CUSTOMER DATA—For the 12 Months Ended December 31st			
Kilowatthours per Customer	1,070	1,022	+ 4.7
Average Annual Bill	$38.52	$37.51	+ 2.7
Revenue per Kilowatthour	3.60¢	3.67¢	− 1.9

(*) By courtesy of the Federal Power Commission.

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume 12 APRIL, 1944 No. 4

The American Way Is Not the Easy Way

By W. C. Mullendore

THE greatest revolution in our history took place in 1933, and the two outstanding facts about it were these:

1) It represented not only a break with, but a complete departure from our past—a denial of the lessons which our whole history had taught. Its philosophy was that there was an *easy way* to pay for an entire nation's economic sins, and that the essence of it was to do more of the same—to drink yourself sober, *to borrow and spend our way out,* under the leadership and direction of government; *that the wrong thing done by citizens in business became right when done by government.*

2) A very large percentage, possibly a majority, of those engaged in business, approved of or silently acquiesced in these measures.

What were the principal measures of the so-called recovery program of 1933? Most of us have forgotten but these were some of the Acts in that Hundred Day Congress:

I) The Emergency Banking Act, including the Guarantee of Bank Deposits.
II) Gold Contracts and Legal Tender —suspension of the Gold Clause.
III) Agricultural Adjustment Act.
IV) Securities Act.
V) Home Owner's Loan Act.
VI) Tennessee Valley Act.
VII) National Industrial Recovery Act.

Garet Garrett wrote about the Hundred Day Congress in August, 1933, and in his article he summed up the powers transferred to the President in that Hundred Day Revolution, as follows:

"1) To control and administer all business in the public interest;

"2) To govern production, prices, profits, wages and the hours of labor;

"3) To determine the economic policy of the country; that is to say, whether it shall be national or international;

"4) To debase money in behalf of the debtor class;

"5) To produce inflation in the interest of certain classes;

"6) To reapportion private wealth throughout the nation, in his own judgment.

"7) The power specifically to reduce the gold value of the dollar one-half—or, that is to say, the power, simply by proclamation, to double the price of everything that is priced in dollars, and to halve the value of every obligation payable in dollars, such as debts, bonds and mortgages, insurance policies, bank deposits."

Garrett summarized the situation surrounding the Revolution in these words:

"The academic mentality wrote the laws and decrees, the President approved them, and there was the spectacle of conservatives, liberals, radicals and demagogues walking in step toward something no one was sure of, moved by opposite reasons, some in the dark, and some in a new light of their own making, invisible to the rest."

And again:

"There seemed to be nowhere any resistance. Finance, business, industry, agriculture, creditors and debtors, capital and labor, all on one millennium step. That was not quite so. The academic mentality, becoming aggressive as its authority increased, learned how to silence opposition. * * * Thus a great deal of protest was silenced in private."

The Revolution was carried through, the whole trend of our economic history was changed from self-reliance of the individual to reliance upon collective action; power was transferred to the President, to Government, to Bureaus, on the theory that there was an easy way out of the depression.

The detail of what happened is not important for our purpose here. The point, the all-important point, is that, without knowing it, the free American people surrendered their freedom in those hundred days; and traded it for Government Guardianship. The Free American people, I say, did not know they were doing this revolutionary thing—it just seemed so easy to relax and let ourselves go. Freedom is the Hard Way. Self-Reliance is difficult. Taking the risk and bearing the penalty of failure is often uncomfortable. When a "kind" Government offered to take the risks and hardships on its shoulders, an ignorant and thoughtless generation acquiesced.

The most remarkable, extraordinary, exceptional, unaccountable fact about this radical Revolution, I repeat, is that it was accomplished not only without violent opposition, but almost without any opposition which made itself felt or heard throughout the country. The revolutionary measures were enacted into law by an overwhelming vote of the Congress of the United States; they were implemented in our national economic and governmental structure; all our old ideas of economy in government were cast aside in scorn and derision; our monetary system was turned upside down; the government's most solemn obligations were repudiated; at a time when we needed more production, we reduced production and destroyed food and clothing; encouraged people to consume without producing, shortened hours of labor and raised prices, and told the people generally to relax and rest and government would obtain for them what they needed—obtain it from their neighbors, and deliver it to them. The old virtues were derided along with our ideas of the powers reserved to local and State government; and the interstate commerce and general welfare clauses of the Constitution were used, together with the packing of our Federal Courts, as a means of concentrating power in the hands of Federal Bureaucrats.

The foregoing is but a very inadequate and mild summary of the extent of the Revolution. It could not have been more complete if we had suddenly imported a

foreign ruler and deliberately abandoned the Constitution of the United States and all the old precepts which guided our fathers.

All this occurred eleven years ago, and the majority of the American people, including a large percentage, if not a majority of American businessmen, are not yet aware that anything more has occurred than what is often referred to as "one of those swings of the pendulum." You have heard it constantly referred to in such terms, and you still hear it. "Oh, sure, we have had these swings toward the left before, but we always swing back." Or, this one: "Yes, we now and then take a detour off the main highway, but we don't stay long on the detour."

Think of it! Eleven years ago, we not only left the main highway of American life; we took not a detour, but a road to the left leading *right back* in the direction *from which our forefathers had come centuries before*—right back into the morass of State control of the individual, into the centralized power and guardianship which characterized monarchy and feudalism; and more than half of our people are *Still Thinking of and Treating it as a Mere Little Detour.*

You wouldn't have believed it before it happened, but here it is—a fact staring you in the face—a fact you live with every day: *The fact that one of the most difficult features of this revolution is to convince the people who are its victim that it has happened.*

You hear people every day now talking about fixing it all up by a change in the party label of those who hold public office. And *that,* in face of the fact that the candidates of the opposition party both in 1936 and 1940 endorsed most of the fundamental changes in the functions of government which have been brought about by the Revolution. If you have forgotten it, read the platforms and the speeches of the candidates; and you will discover that they were for the new functions of Government; in favor of the new relationship between the government and the citizen. They did not denounce the Wagner Act nor the Social Security Act, nor the control by the Federal Government of investment funds in the hands of the citizen; nor did they propose to abandon managed currency, or the socialization of credit for the farmer and the home-owner. In other words, while they derided the N. R. A. and its failure, they were still endorsing most of the principles of the N. R. A. I am in favor of changing the party in power, but unless there is much more of a change by way of a revolutionary reduction, of the powers of the Federal Government and the relationship between the government and the individual than has been advocated by rival candidates in our last two Presidential elections, a change of party, while a help, will be no cure.

No, this Revolution, while it was put through by the party in power, has now so infected the thinking and understanding of the American people, that it is not going to be overthrown by a mere change in party labels. Remember, too, that all the voters from 21 to 32 have had no other government, and that most of the children of this generation have been taught to respect this paternalism as American.

And Businessmen Are Not Immune

Of course we in the business world usually take it for granted that we are aware of and understand all this. *Let's see about that!* Who was it that marched in the N. R. A. parades, and rushed down to Washington to help build a "Code?" Who was it that went in for the Easy Way of price-fixing and wage-fixing?

Is it this "man in the street" (whom we hold stands in such dire need of education) who has been making rosy predictions about how this present regime would pass away overnight like a bad dream? Who has been writing the interviews and the annual reports to stockholders and insisting that after all politics can't "hurt my business?" As I remember it, it has been the businessman, the manager of business, and some rather prominent ones too, who have been deriding the pessimist who dared to say these were serious changes in fundamentals with which we were now dealing.

Then, too, it was the businessman in his Chamber of Commerce and in his Trade Association who applauded some of these great spending programs—just so long as there were going to be a lot of new public works in his community.

There was never a more perfect example of State Socialism than the Tennessee Valley Project—where Government took over and has for more than a decade dominated the economy of a whole region. Yet the businessmen of the Tennessee Valley, aided and abetted by a good many businessmen, as well as politicians elsewhere, helped to put that over. It was the "easy way" to get business going—to get some of the neighbor's wealth through the aid of the Government, and businessmen forgot their scruples and went for it.

Recently, prominent business leaders have endorsed Social Security as a permanent institution for the United States. And others have endorsed Managed Currency. Neither can be continued if we are to return to the American way. I will go farther and prophesy that if either are continued we will proceed on the road toward State Socialism along which we have already travelled so far.

I dare say, therefore, on the basis of these and many other similar facts, that while the demagogue and the academic theorist were chiefly responsible for getting the revolution started, it still would never have been possible except for the direct and indirect cooperation of the businessman himself.

Suppose for example that instead of holding those big parades and mass meetings in behalf of N. R. A., we had held parades and mass meetings against it and the whole mess of legislation which was foisted upon the American people by that Revolutionary One Hundred Days Congress.

Just suppose that as much effort had been made by businessmen to oppose appropriations for P. W. A. as were made to support them. Suppose these delegations of businessmen who went to Washington to promote some pet flood control or other P. W. A. or W. P. A. project had shown equal energy in opposing them.

It is very easy to rationalize surrender of freedom as "recognition that times have changed." It is in fact much easier to alibi our failure to oppose bad legislation by saying, "There's nothing we can do about it anyway," than it is to take the trouble to find out why it is harmful, and to take the trouble to explain to our friends, our families and our employees why it is bad.

When business was slow in home-building and the boys came forward with the idea of socializing credit, disguised as "home loans guaranteed by Government," businessmen endorsed the idea, though no one claimed that 90 per cent loans were wise or sound. Similarly many of us surrendered to wage and hour legislation, rationalizing it on the ground that it would force the chiselers who undersold us by "exploiting" Labor, to pay higher wages. We welcomed that Government intervention—at least some of us did.

In connection with many of these ap-

propriations, grants-in-aid, measures that would help to stimulate business temporarily, we recognized them as wrong; but we could justify our support of them because the other fellow was going to benefit from the wrong, whether we did or not. It was easier to fight for the same *wrong* that the other fellow was enjoying—easier than it was to fight for our own and his fundamental *rights*.

It's habit-forming, this business of turning to Government for aid in providing employment, for aid in making loans, for aid in building some local project, for aid in promoting or protecting our market. It's easier sometimes to call in Government than it is to deal with our employees. And the longer we follow the temporarily Easy Way, the harder it is to regain the main highway.

And now we have the War, and with every day of the war's prolongation, the dependence upon Government direction and guidance, Government contracts, and what Government is going to do about wages and price-fixing, and surplus materials, and cancellation of contracts, becomes more dangerous. We are beginning to think of Government first. We are becoming "Government-minded" in all our plans for the future.

The longer a return to the Pricing System, the Exchange System, the Law of Supply and Demand, the payment of debt, the balancing of the books, is postponed, the harder it will become to get back to the American Way, to Free Enterprise, to Self-reliance. And yet right today after eleven years of New Deal and 27 months of War, with our Free Enterprise system almost wholly suspended, and a public debt and international obligations such as the human mind cannot comprehend, ahead of us, businessmen in almost every daily paper are talking about the bigger and better prosperity which is immediately to ensue with the War's end. That should give us some idea how little is comprehended as to the fix we are in.

The only way we can plan tomorrow's production is to plan tomorrow's consumption, and a people whose consumption is planned for them is no longer free. Surely, we can do some advance estimating. We can survey our potential resources. We can find out from people what they guess they will make tomorrow and from other people what they will buy tomorrow. But *remember* that their plans are based upon their guess as to what their money will be worth, and how much they will have of it, and above all their guess that they will be free to do as they please so far as government is concerned. They know nothing of 75 per cent of the facts which will determine not what they want to do but what they must do.

Instead of asking the Joe Doakes' and the Mairzy Doakes' what they are going to buy and how big a house they are going to build tomorrow, we might be doing them and our country a much better service if we would expend this energy which we are now expending on a great deal of the Postwar Planning, on some educational efforts to dispel the idea that we are getting richer day by day during the war because people are saving more of these debt-created dollars each day the war lasts. We might also be holding clinics demonstrating that you cannot continue to take more out of a pot than there is in it; demonstrating that instead of the war making it possible to continue high wages and time and a half for overtime, the war is making us all poor and that means we will have to work harder and longer hours for less pay, and return to limited government, or go smash on the rocks of national bankruptcy. We might be telling our people that this foreign market—this wonderful opportunity in the Pacific and in Europe and in Russia which is being opened up by the war may mean something to future generations but for us, it is for the most part an opportunity to give goods away in exchange for nothing or at least nothing more substantial than a promise to pay sometime in the far distant future—for the simple reason that everyone of these countries has nothing now and is rapidly getting less and less.

We might also tell the American people that while they have had a high standard of living in America, that standard of living was the product solely and only of a free competitive enterprise system, under which people worked for a profit, and under which those who worked hardest and most successfully were proportionately rewarded. In other words, we might tell them that the American way was the hard way, even though it produced the most and the best; that today that system has been suspended, and there is a very large group of Americans who want to keep it suspended; and until it is restored the hopes and plans predicated upon its production should be postponed.

We might tell the American business-

(*Continued on page* 128)

MEETING OF ELECTRIC AND GAS INDUSTRY ACCOUNTANTS

Cleveland, Ohio—April 25, 26 and 27

Preparations for the meeting of utility accountants to be held at the Cleveland Hotel in Cleveland, Ohio, on April 25, 26 and 27 have gotten away to an excellent start. The meeting, to be held jointly by the accountants of the electric and gas industries appears, judging from the preliminary program, to be an ambitious one, but in times such as these, maximum benefits can be secured only by the interchange of best ideas and practices and the dissemination of the very latest thinking on the many problems with which the utility accountants are faced today.

The program, which calls for a two and a half day session starting off with registration at 10:00 A.M., April 25, and General Session commencing at 2:00 P.M. the same day, will not feature a single theme, but rather will cover several of our most trying problems. Men of unusual caliber and breadth of experience have been chosen for their outstanding ability as speakers on the General Session Program. Personnel comes in for considerable attention, while federal laws and regulations as affecting both present and post war periods have their place on the program. War time procedures and the lessons learned in the past few years will be thoroughly covered, with a view to their application in the future.

Depreciation, Original Cost, Overheads, Plant and Property Records, etc., will be discussed at the group meetings in the light of recent developments. The meetings of the smaller groups have clearly been designed to afford a thorough discussion of their more detailed problems and make available an opportunity to develop the best practices so far produced.

Representatives of the utility industries are cordially invited to attend the conference, regardless of whether or not they are members of either of the utility associations.

GET RAIL AND HOTEL RESERVATIONS NOW!!!

Reducing Government Questionnaires Through Utility Sub-Committees

By David J. Guy

Assistant Manager, National Resources Department, United States Chamber of Commerce, and Secretary of Public Utilities Sub-Committees of the Advisory Committee on Government Questionnaires

IT is a little over a year now since the Advisory Sub-Committees on Government Questionnaires to Public Utilities were organized. Modestly and quietly these committees have been at work, on a voluntary basis, and in an advisory capacity, all with a view to reducing to a minimum the time and labor that their particular industry must devote to Government Questionnaires. Very substantial results have been accomplished, the effects of which in many instances will not terminate with the war emergency, but will continue as a permanent saving. As will be seen, these sub-committees operate largely on their own volition and without restraint since they are only advisory in character. Their field of activity is not channeled and they may dig in almost any place they suspect economies in reporting can be made.

A recent action by the Securities and Exchange Commission provided that, with respect to its Form U-14-3, its Annual Report for Registered Holding Company, 10 schedules may be omitted.[1] The Commission, at the same time approved a set of supplemental instructions relating to Form U-5S, the Annual Supplement to the Registration Statement, the effect of which is to substantially reduce the reporting burden on respondents.[2]

These actions by the Securities and Exchange Commission parallel similar earlier actions by the Federal Power Commission concerning its annual report Forms Nos. 1 and 2 from Public Utilities and Licensees, and from Natural Gas Companies respectively, and its Power System Statement. Other improvements have also been made by the War Production Board with respect to data required from the utility industry.

I believe the utility industries will be interested to learn something of how these improvements are being achieved; who initiates the changes in reporting requirements of federal agencies; and what the mechanism, the procedure, is that concerns itself with this subject. This is no occasion to applaud results or to compliment those who have achieved them. Rather it is intended to convey to the industry some conception of a little known activity and also, by the same token, a little known opportunity that is still available for accomplishing some much needed curtailments and revisions in reporting practices.

Origin of Control Over Data Collecting

Almost every governmental function needs industry data as a basis for the determination of policies, or as tools for policy effectuation. Generally, as the functions of the Government increase, there is need for additional information.

The utility industry, long in the habit of reporting to Government—for other reasons, perhaps, than its exposure to the "gold-fish bowl" influence—has been the object of more Report Forms than perhaps any other industry. Yet, notwithstanding the fact that it has long been geared to prepare and file reports, the influences of war have increased the number of reports required from utilities, and at the same time reduced the manpower available to provide the required information.

The Federal Government has long recognized the need for coordination of the statistical activities of the Federal agencies.[3] Not until the end of 1942, however, were the limitations upon the data-collecting activities of the Federal agencies made crystal-clear. On December 24, 1942, the President approved Public Law 831 of the 77th Congress, known as the Federal Reports Act of 1942.

This law declares it to be the policy of Congress:

"that information which may be needed by the various Federal agencies should be obtained with a minimum burden upon business enterprises (especially small business enterprises) and other persons required to furnish such information, and at a minimum cost to the Government, that all unnecessary duplication of efforts in obtaining such information through the use of reports, questionnaires, and other such methods should be eliminated as rapidly as practicable; and that information collected and tabulated by any Federal agency should insofar as is expedient be tabulated in a manner to maximize the usefulness of the information to other Federal agencies and the public."

The Act was more than a declaration of policy. It makes it mandatory upon all Federal Agencies to "clear" in advance with the Bureau of the Budget before they embark upon any data-collecting venture.[4] Moreover, by the terms of the Act, and more specifically by the provisions of Regulation A, issued thereunder by the Director of the Bureau of the Budget, the collection of information is made broad so as to include application forms, administrative forms, questionnaires, telegraphic requests and other similar devices for the collection of data when 10 or more respondents are involved.

Thus, the regulations embrace priority applications, questionnaires used a single time for a research purpose, annual or other report forms used for administrative purposes by regulatory agencies, telegraphic or telephonic requests for a statistic, as well as record-keeping

[1] The schedules involved are: Nos. 107—Miscellaneous Investments; 110—Sinking Funds; 111—Miscellaneous Special Funds; 116—Special Cash Deposits; 117—Temporary Cash Investments; 118—Notes Receivable; 122—Other Current Assets; 160—Notes Payable; 167—Other Current Liabilities; 245—Other Interest Deductions.

[2] Among a number of others, the changes reduce the amount of reporting previously required by Items 16(a) and 16(b) with respect to individuals who are compensated entirely by a registered holding company; Item 16 (g) 3, the data required to be furnished as to payments or contributions for advertising, etc., as well as 16 (g) 1 and 16 (g) 2; sub-item 6 of Item 6 relating to damage suits, and Exhibit D.

[3] In 1908 President Theodore Roosevelt by Executive Order 937 established an interdepartmental statistical committee. During the first World War a Central Bureau of Planning and Statistics was organized under the War Industries Board. In 1919 its functions were transferred to the Bureau of Planning and Statistics. In 1929 a Federal Statistics Board was established. This was succeeded in 1933 by the Central Statistical Board, established by Executive Order issued by President Roosevelt, and later, in 1935, given statutory authority for a trial period of 5 years. In 1939, President Roosevelt transferred the Board's functions and its staff to the Bureau of the Budget, under the Reorganization Act of that year. At present, the Division of Statistical Standards, in the Bureau of the Budget, derives its authority from the Budget and Accounting Act, 1921, as does the rest of the Budget Bureau, from Executive Order No. 8248 of September 1939, which defines the functions and duties of the several parts of the Executive Office of the President, from its status as a part of the staff arm of the President, as well as from specific legislative action—the Federal Reports Act of 1942.

[4] There are a few notable exceptions: Bureau of Internal Revenue, Comptroller of the Currency, bank supervisory agencies, and similar other organizational units.

requirements, including systems of accounts and systems of classification, which are to be used or capable of being used for the collection of information.

Advisory Committee Appointed

Just in advance of the approval by the President of the Federal Reports Act of 1942, perhaps anticipating such action by Congress, Mr. Harold D. Smith, Director of the Bureau of the Budget, wrote to a number of national organizations requesting "the counsel of those who are intimately aware of the problems to which governmental requests for information give rise in business offices."[5]

Thus the Director of the Bureau which is charged with the responsibility of planning and promoting the improvement, development and coordination of Federal and other statistical services, sought the advice of the business community. And business, particularly certain segments thereof, has been quick to accept the offer, to the mutual benefit of both business and Government.

To be sure, businessmen endorse the idea that the Government can no more operate successfully in a vacuum of facts than can business. Each must act on the basis of observed facts rather than on unsupported hunches. The Budget Bureau's invitation to business to counsel with it was "in order to assist in evaluating the necessity for the questionnaires which it must clear, and to weigh such necessity in the balance which the requests impose upon business and industry."[6]

The committee formed by the participating associations is called The Advisory Committee on Government Questionnaires. Organized in March, 1943, it maintains liaison offices in Washington, through which its members and those of its sub-committees cooperate with the staff of the Bureau of the Budget.

The functions of this Committee are exclusively advisory to the Budget Bureau, and unlike many advisory committees which are appointed by a department or other agency of the Government, the personnel of this committee was appointed by and is responsible only to the business community.

The Advisory Committee operates largely through sub-committees, each organized along well defined lines. "The charter of operations," says the Committee's 1st Annual Report, "is in some cases restricted exclusively to a single industry, as for example questionnaire problems of the arc-welding industry; in other cases there are sub-committees which represent segments of an industry such as the organic chemical industry, or a segregated part of an industry, as for example problems of accounting questionnaires of the public utility industry; and in other cases sub-committees have been formed to devote their attention to subject matter or functional problems that affect many lines of business, as for example WPB-732, the Manning Table and Replacement Schedule questionnaires, or Forms A and B of the Office of Price Administration."

Organization of Utility Industry Sub-Committees

The public utility industry, including gas, electric and water utilities, and both the publicly and privately owned parts thereof, were among the first participants in this industry advisory activity.

The Advisory Committee gave consideration to the questionnaire problems of the utility industry at its February 9, 1943, meeting when it authorized an exploratory meeting be held to which were invited representatives of all the national associations in the utility industry. This group met in New York City on March 19, 1943, on the call of W. J. Donald, Chairman of the Advisory Committee.[7] At this meeting, decision was made to organize three sub-committees, each to devote itself to a separable problem. These sub-committees were:

1. Financial and Accounting
2. Materials Controls
3. Engineering and Facilities

Each of these sub-committees has been active in its own field, and the amount of activity, either formal or informal, has been directly reflected in two important directions—one curative, the other preventative. First, there have been material and substantial improvement in both questionnaires and reporting requirements, some of which had been of long-standing; second, the very existence of the sub-committees has given pause to the drafters of questionnaires. It is the policeman-on-the-corner idea.

Very active, and result producing is the Financial and Accounting sub-committee, the first to be organized. It may be properly said that this group is not only the most active of the three sub-committees, but in the annals of the Advisory Committee is one of the most active of 40 odd sub-committees. Its members are W. T. Neel (Philadelphia Electric Company) Chairman; H. D. McDowell, (American Water Works and Electric Company); A. W. Hatch, (Ebasco Services); Harvey S. Pintsch (Virginia Electric and Power Company); Otto Price, (Boston Consolidated Gas Company); and E. K. Higley (Middle West Service Company).

This sub-committee has held a number of meetings, and during intervening periods its members have been extremely active in research activities concerning projects which the committee had undertaken.

Notable among these were the studies undertaken of Report Forms of the Federal Power Commission and of the Securities and Exchange Commission. The objective manner in which it has dealt with assignments is attested by the consideration accorded the committee's recommendations by the Budget Bureau. It has "followed through" on these recommendations with the respective agencies, and they in turn, have accepted most of them.

Its work is by no means completed. Notwithstanding the substantial results already achieved, much remains to be done, not only from the point of view of obtaining for the industry reductions in needless paper-work as a war emergency, but long-range examinations of the systems of accounts and other record-keeping requirements, and permanent improvements in report forms. The extent to which this sub-committee can effectively perform its functions is in direct line with the extent to which the industry will funnel through its ideas, suggestions, criticisms, complaints and comment.

Less formal in its organization and operations, but equally as effective, has been the sub-committee on Materials

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[5] At present there are seven (originally five) participating organizations namely: American Retail Federation, American Trade Association Executives, Chamber of Commerce of the United States, Controllers' Institute of America, National Association of Commercial Organization Secretaries, National Association of Manufacturers, and National Industrial Council.

[6] From the First Annual Report of the Advisory Committee on Government Questionnaires. Copies of this report are available on request to the Committee addressed to 1615 H Street, Northwest, Washington (6), D. C.

[7] Attending this exploratory meeting with Mr. Donald, were the following: W. G. Bourne, Jr., Treasurer, The Commonwealth and Southern Corporation; W. N. Lewis, Director of Statistical Department, Electric Bond and Share System; W. T. Neel, Auditor, Philadelphia Electric Company; R. B. Freeman Chief Engineer, American Water Works and Electric Company; Steve C. Tate, President, National Rural Electric Cooperative Association; Glen Forster, Controller, Brooklyn Union Gas Company; Kurwin R. Boyes, Secretary, American Gas Association; Harry A. Jordan, Secretary, American Water Works Association; David E. Cohn, representing the Bureau of the Budget; and David J. Guy, Chamber of Commerce of the United States, representing the Advisory Committee.

Controls. This group,[8] under the chairmanship of Ernest R. Mitchell (Cincinnati Gas and Electric Company) has dealt exclusively and most successfully with orders, regulations and forms of the War Production Board (Office of War Utilities) and other war agencies. Mr. Mitchell through collaboration with his committee, others in the industry, the committee's secretary and the Budget Bureau's Staff has been active in dealing with the questionnaire problem at its source.

A method of measurement of this Committee's work has yet to be devised. On one assignment alone, it has been estimated that a reporting requirement initiated by a Federal agency and disapproved by the Budget Bureau involved a saving to the industry of 840,000 man-hours.

The third sub-committee, relating to Engineering and Facilities has been only recently activated. Two of its present members, however, have been active for some time. They have participated in negotiations with the Federal Power Commission (through the Budget Bureau) as to changes in the Annual Power System Statement. J. R. Baker, Pennsylvania Water and Power Company, and G. H. McDaniel, American Gas & Electric Service Corporation, cooperated with Mr. Neel, Chairman of the Accounting and Financial Sub-committee, on those matters outside the purview of the finance group, prior to organization of the Engineering and Facilities Sub-committee.[9]

Revisions in the Annual Power System Statement, as in the case of the aforementioned report forms, have been characterized as being of substantial benefit. Some of the revisions are of a clarifying nature, and because of the hitherto existing ambiguities, needless hardship was frequently imposed on the respondent systems. A notable case in point was the statement's Schedule 18A, System Maps and Diagrams. The previous requirement has been variously interpreted by systems as requiring four sets each of dozens (sometimes scores) of maps, sketches, and one-line diagrams. This requirement was, by reason of the Committee's recommendations, changed to two copies each of seldom more than three maps. A number of other changes in schedules were similarly revised, and the burden correspondingly reduced.

[8] Besides Mr. Mitchell it includes: Harry E. Jordan (American Water Works Association); A. E. Moore (Philadelphia Gas Works Co.); W. P. McArdle (Ebasco Services, Inc.); E. J. Rowe (Supt. Water & Light Dept., Wellesville, N. Y.); George N. Reed (Hope Natural Gas Co.); E. J. Stoneman (National Rural Elec. Cooperative Association); J. M. Imlay (Washington Gas Light Co.).

[9] Other members are: Merle Rainey (Edison Elec. Institute); W. C. Huebner (Ebasco Services); Harry Jordan (American Water Works Assn.); Adam N. W. LaRose (Allentown-Bethlehem Gas Co.); Malcolm Barton (Hartford Elec. Light Co.); R. M. Cooper (S. C. Pub. Service Authority); Clyde T. Ellis (Natl. Rural Elec. Coop. Assn.).

Control Air-Tight and Fool-Proof

The effectiveness of the Budget Bureau's review process and of its mechanism for assigning approval numbers and expiration dates affords an unparalleled opportunity to business and industry to be heard during the formative stages of new questionnaires, or when existing forms are re-examined.

The Budget Bureau's regulations require that every authorized Federal form, or other data request, must bear a Budget Bureau approval number, and in most instances an expiration date. Whenever a form is received without an approval number thereon, there is a fair presumption that the form has not been reviewed and that the form has not been authorized. Such cases should be reported for attention or advice to either the Budget Bureau or to the Advisory Sub-committee concerned.

The expiration dates on forms mean that the forms will be obsolete beyond that date unless they are again submitted and approved, in which event a new date is assigned. The date serves as advice to respondents, not only as to the life of temporary or short-term forms, but as to the date in advance of which the review of the form is again undertaken. It has been found that frequently a form is designed to serve a well defined useful purpose, but that long after the original need has ceased to exist the form remained in effect. On other occasions, even though the usefulness of the original need continued, there were refinements, modifications and clarifications that seemed desirable. These re-examinations at periodic intervals are thus possible, and respondents to governmental requests for information are urged by the Bureau of the Budget to make their comments known.

While the accomplishments during the first year of activities of the utility sub-committees are not being evaluated in terms of dollars or man hours saved to the industry (if indeed they are capable of being so evaluated), there is abundant testimony of the value of collaboration and cooperation. One mid-West utility company official has declared that their current expenditures for preparing returns on governmental forms is at a rate of $5,000 a month less than a year ago. Another has praised the procedure by which he "can be heard by a friend at court." Besides these positive gains, another has spoken eloquently of the opportunities which the Advisory Committee and its sub-committees offer through working with the Budget Bureau.

It is to be remembered that the utility industry has benefited, not only through the direct action of its sub-committees (the three devoted to utility forms) but through the action of other groups who work on the review of forms that cut across all industrial lines. The committees who have devoted themselves to labor forms, to accident and health reports and others, many of which include utility companies among respondents, have also served the industry well.

No review of the utility sub-committee activities would be complete without acknowledgement of the several prime-movers in this economy effort, without whose zeal and self-effacing activity this first chapter could not be written. On the side of the Bureau of the Budget there are Dr. Stuart A. Rice, Assistant Director in Charge of Statistical Standards, and his able assistant, William R. Leonard, who have given freely of their time and talents to the industry's problems. Peyton Stapp, Clearance Officer of the Division of Statistical Standards, and David E. Cohn, the Division's utility specialist, have also rendered invaluable assistance. Mr. Cohn, through years of experience in State Commission Regulation, and more recently with the Federal Power Commission, brings to his task an intimate knowledge of the subject matter involved.

William J. Donald, Chairman of the Advisory Committee, and Russell W. Schneider, its Executive Secretary, have also shown a special interest in the questionnaire activities relating to utilities. There has also been every cooperation with committees of the Edison Electric Institute and American Gas Association. The staff of the Federal Power Commission has been especially helpful, and the fine relationships with it and that of the Securities and Exchange Commission augurs well for the future.

Congress has charged the Bureau of the Budget with a grave responsibility and the Bureau has wisely turned to industry for assistance in discharging this responsibility. Industry's opportunity to help itself is by no means exhausted, and a little head scratching along this line now may prevent head aching in the future.

An Appraisal of Farm Electrification Needs

By Roy E. Hayman
Oklahoma Gas and Electric Co.

STATISTICIANS tell us that there are approximately two and one-half million farms which now have electric service available, but the percentage of these farmers who have completely electrified their homes and farms is extremely small. It is not our purpose at this time to go into details of saying why this is true; suffice us to say that the real reasons fall under one or two heads, or a combination of both. They are, first, lack of selling; and, second, lack of equipment. And I prefer to deal not with the oft-reported 15 per cent that produced 85 per cent of our farm products but rather with the 85 per cent who produced 15 per cent of our salable farm products.

It is this 15 per cent of our farmers who are producing our great supplies of wheat, corn, and cotton, our generally so-called "surplus" crops, and, during the time of these so-called "surpluses," there has been a tremendous shortage of the vitamin crops. This is indicated by a report from the Department of Agriculture, which says in part: "For everyone to have the essential elements of nutrition, we will need in excess of the 1929 production — 108 per cent more butter, 79 per cent more fresh vegetables, 53 per cent more milk, 43 per cent more eggs, more meat of all types, more citrus fruits, and it would require forty million acres more than the 1933 plantings to grow all of our needs."

The 85 Per Cent

It is the 85 per cent of the farmers mentioned above that, in the main, is producing these needed foods, and will have to continue to do so if they are to be produced. It is with this great mass of farmers that the real need of electrical equipment exists and where the great market will be. Electrical equipment designed to meet the needs of these people so as to eliminate as nearly as possible the drudgery of the many tasks these people must now do by hand. For this class of farmers, a satisfactory water pumping and distribution system is more important, in the relief of drudgery in their annual operations, than a tractor to plow their fields. It is with this class of people that our real farm problems lie.

It is necessary that we have a clear picture of the situation existing and the problems which must be solved before a solution can be attempted. It is my purpose to attempt to present these situations to you as I have found them during the last 15 years of very close observation of a large number of farmers of all classes and types, within the State of Oklahoma, and, while I might be inclined to point particularly to the problems in Oklahoma, I think I am justified in so doing because in general they will apply to the farming area as a whole, particularly the great plains area, commonly referred to as the "bread basket of America."

Farm Electrification Must Be Sold

In presenting these facts to you, I want to place them under three headings: (1) Sales, (2) Service, and (3) Equipment. All equipment used outside the farm home, and much of the equipment used inside the farm home, must be sold. I can not impress this fact too forcibly. The farmer is not demanding electrical equipment, particularly production equipment. His wants are for heavy equipment—equipment when purchased will tend to reduce his load or employment factor rather than equipment that will improve this factor. The fact of the matter is that many of our farmers have mechanized themselves out of a job, and the solution of the farm problem rests almost entirely on improving his personal load factor or employment factor. This can be done, in my opinion, only by the utilization of many pieces of electrical equipment in his general farm operation, much of which needs to be developed.

Because of the great distance which must be traveled to reach these farm and rural customers, the rural salesman of the future must be a much broader person than the specialty doorbell-ringing salesman whom we have known in the past. Such persons are not going to be easily found. As a matter of fact, we probably do not have them available anywhere—they must be made. They must have a good sound working knowledge of the electrical industry and electrical equipment and, in addition to this, must be well versed in the farm operations with which he may be dealing. The late Mr. Owens, formerly president of my company, on many occasions, made the following statement: "In order to properly sell electric service, you must know more about our customers' business, so far as application of power is concerned, than the customer himself." Time has proved the truthfulness of this statement. In addition to the requirements and knowledge of farming operations and the application of electric power, this person must have the ability to sell.

Let me illustrate. We have a multiplicity of chicken brooders on the market today, some good, some bad. The salesman must know enough about heating, ventilation, and sanitation of brooding-age chickens as well or better than the farmer in order to sell properly designed and constructed brooders over the poor brooder because of the price differential.

Let me give you another example of why equipment must be sold. This example refers to running water. Over a long period of time, we have found, after constructing rural lines into a given area, that unless a vigorous water pumping sales program is carried on, the farmer will continue to purchase wind wheels rather than motor driven pumps even though we, who have investigated, know that it is cheaper to pump water with motors than it is with wind wheels.

Standardization to Simplify Servicing

Now, let's talk briefly about service. Electric equipment, like automobiles, some time after selling will require service. This problem is more complicated in the rural area than in the city because of distance and the difference in mileage that must be traveled. Electrical equipment that does not operate is no more conducive to the selling of additional equipment than an automobile that will not run is conducive to the sale of the same make. I am sure that our service problems would be very materially reduced and simplified if arrangements could be made so that our designing engineers could service equipment they have designed, in the dirt and grime of a farmer's barn or in the basement of his home, in temperatures of 100 degrees and upwards, with little or no ventilation and with all the insects present that torment man, or in a snow storm with a

30-mile-an-hour wind off the north pole. If he could have such experiences, I am sure that he would not design a hammer mill that makes necessary the removal of fan housing in order to grease the main bearing, or specify a stud bolt with 24 threads to the inch which can be easily lost and never found, and no other such bolt exists, nor dies to make it with, in a town the size of Oklahoma City. Standardization of much of our equipment would be of untold benefit. Standardization of parts of competitive makes, I feel sure, would be of very great benefit to the industry as a whole, and in the long haul would not, or could not, be detrimental to competitive makes. Motor protection is a serious problem. A practice of building in adequate protection equipment, as an integral part of the motor winding of all motors, would be of untold benefit to all concerned.

A typical example of what I am talking about: We have a customer who has enjoyed, for the last two years, the privilege and luxury of running hot water supplied by a heater manufactured by one of the nationally known manufacturers. Several months ago a very severe lightning storm destroyed or damaged much equipment on his farm, including the heating element in this water heater. We were able to restore service to the water pump because pressure switches are interchangeable. However, he is still without hot water because apparently delivery on a new element cannot be made. There is a heating element available of competitive make, but which cannot be used. I will let your imagination tell you of the thoughts of this customer of ours. The sales organization that sold the equipment can not satisfactorily answer the farmer's question as to why this equipment was not built interchangeable. Neither can I, and I have a serious doubt that any of you can logically do so.

Electric Equipment Is Adapted Equipment

Now, we are coming to what I consider the meat of this paper, and that is: farm equipment, or rather its lack. With all of the many complimentary things that can be said about electrical equipment and its use in the rural field, we must be frank to admit that almost all of this equipment is adapted equipment. That is, we have adapted equipment designed and manufactured primarily for urban use to engine drive in the rural field. The basic design of most of our farm machines has changed very little or none since the machine's first introduction. We have merely adapted an electric motor to a piece of equipment designed primarily for engine drive.

Some of you can remember the effort to motorize industry prior to World War I, when we merely attempted to replace an engine driving a line shaft with a motor, and you will recall the disappointments resulting. It was not until manufacturers began to design a machine for electric drive that industry started to electrify. Quite often this new design resulted in not only an entirely different appearing machine but, in many cases, completely changed existing accepted operations, and so I think we can draw a parallel from these past experiences with the task of electrifying rural America.

Let me cite what I call a few critical examples. Some of these may surprise you because the reports coming in to you from the field of the farmer's statements, such as: "That's the finest refrigerator I ever saw," or "That's the best stove ever made," have lulled you into the frame of mind that perhaps we have reached the ultimate in these two pieces of equipment. Let me assure you this is not the case.

Let's examine the household refrigerator that has functioned so well and so satisfactorily for the urban customer and see if it is designed to meet the needs and wants of the farmer. We must remember that the farmer's wants and his needs are not necessarily one and the same thing. His wants are limited to his knowledge of what is available. His needs are oftentimes very real and he may not necessarily be conscious of them.

If our urban customer is a liberal user of dairy products, for instance, he will place three or four quarts of *chilled* milk per day in his refrigerator. The farmer has need for that many gallons of *warm* milk, and all other foods are about on a par.

Let's examine the electric range. We have found that a high percentage of women discontinue the practice of baking bread when they purchase gas, electric, or oil stoves and discard the use of their solid fuel cook stove. The statement: "She does not bake good bread any more or is too lazy to bake bread," is not the answer. Several investigations disclosed the following, as illustrated by this statement: "Well, when I had my coal or wood stove, it had a water reservoir or a warming oven on it, and I let my bread raise there. Because my new gas or electric stove does not have this, I can not depend on getting a good batch of bread." This is because yeast grows better at an optimum temperature of about 82 degrees and our modern stoves provide no method of assuring a control temperature of this range. Then we find that once these stoves are installed, we can not at all times enjoy a glass of good buttermilk. The answer is the same: "I use to ripen my cream on the reservoir or warming oven and now the cream gets bitter cold before it sours." I find that beneficial bacteria in cream grows in the most satisfactory manner at or near a temperature of 100 degrees.

It seems to me that it would be comparatively easy to construct in an electric range an auxiliary oven, with a thermostat control, so that we could obtain these two temperatures.

Many Uses for Running Water

Let's get back to the water pumps. All of us know, who have handled water pumping problems, that the most efficient and satisfactory method of pumping water is by means of the centrifugal pump, a rotating motion. Why then should we go to the trouble and expense of changing the rotation motion of our efficient electric motors to a reciprocating one in order to pump water from deep wells? Our farm and other rural customers can make profitable use of much greater quantities of water than ordinarily can be secured by wind wheels or the type of pumping equipment that generally has been available for purchase within the average customer's ability to pay. Submerged motors and pumps are the answer to this problem. One company has done a fair job in this field but there is still work to be done. There is hardly a place in the entire United States that supplemental irrigation, at least for the home garden, is not a profitable operation some time of the year. To take advantage of the use of water, we need capacity on the order of 20 to 50 gallons per minute. A great field for the use of underground water is house cooling. Cooling of laying houses for hens might be as profitable in the summer months as lighting or heating the same laying house in the winter. This could be accomplished with underground water which could be stored in private swimming pools to be later used for supplemental irrigation.

The field of water pumping is almost too large to imagine. Perhaps I could give you a comparison that may help. Oklahoma City with almost 50,000 residential customers has 2650 horsepower installed in a central water pumping

plant. This is approximately .05 horsepower per customer and we neglect commercial, industrial, and processing plants. Compare this to the rural customer where the horsepower on water pumping varies from ¼ to 10 horsepower, with the needed average of the order of 3 to 5 horsepower. Now couple this with heat exchange equipment, transfer pumps, irrigation pumps, and you may be able to visualize the field of water pumping. The job, however, is to get it out of the ground in a more advantageous manner than equipment available in the past has been able to do.

Needs of Small Farmers

Let's look into the matter of feed grinding—a very important operation on all farms regardless of their size. First of all, we should correlate the information as to when and what feeds to grind and how fine to grind them, and if we are to take advantage of the great field and need for processing equipment, we must look into the needs of the small farmer—the fellow who is producing his own food, his own feed stuff, and selling off a few animals for the necessary cash income for the operation of his place. It is the customers in this category who are going to supply the large volume of business, both for the manufacturing industry and for the power companies. These people represent the great mass of producers. It is these people, whose personal load factor electric service, with the use of electrical equipment to meet their particular needs, who will be made prosperous.

In this connection of grinding feed, we might look into one supply of food for human beings. I have reference to corn meal. We have just recently completed a survey of food stores in Alabama and Oklahoma. On this survey we checked 151 customers to find out if they would be interested in a small properly designed and constructed unit to grind corn into meal in their establishments, at a cost for power not to exceed 10c per 100 pounds. Of the total number interviewed, 83 were definitely interested, while 68 must be sold. Once this equipment is made available, it should be comparatively easy. Corn bread is one of the major items of food on the tables of many families in the South, and I am glad to note that it is gradually spreading northward. Corn, before it is cracked, remains potentially good food for a long period of time, but as soon as it is cracked or ground it begins to deteriorate quite rapidly, as food, due to the growth of rancidity of the oil contained in the grain. The method of processing grains, bagging and distributing them, precludes the possibility of the ultimate consumer purchasing corn meal in its original sweet state.

I can visualize in the not too far future, a meal mill, not to exceed one horsepower, in practically every food shop in America, a unit somewhat similar to the coffee grinders we now see at or near the checking stands of our self-help stores.

Farm elevators should play an important part in the operation of our grain farms. Little or nothing has been done, so far as I know, in the design and manufacture of small capacity low-lift elevators for motor drive, by manufacturing companies in this field. Some very satisfactory and efficient designs have been worked out, by several men in the rural field, by utilizing fractional horsepower motors and assembled materials, but not all farmers have the ingenuity, tools, and equipment to do this for themselves, and if the farmer is to take advantage of a possible profitable operation of storage of his grain, the manufacturers still have to supply this type of equipment for him.

Fencing by electricity offers an opportunity of real economic value to the farmer because fencing is one of the most expensive operations. It is true, we have numerous fencing units on the market. There is a great opportunity for improvement. My opinion, based on many tests of various pieces of fencing equipment, is that the most effective and practical unit is a homemade one utilizing the ignition coil from a Model T Ford, energized with six volts of battery. The life of this, however, is short, when used as a fencing unit. Therefore, we need some study on basic design of this type of unit, which would require for its operation storage batteries and charging devices of the rectifier variety. Such a fencing unit would offer opportunity of reducing present fencing costs by as much as 85 to 90 per cent, at the same time supplying additional outlet for electrical equipment and, what is more important, the saving in fencing materials could be used very well for the purchase of additional electrical equipment.

Farm Freezers and Lockers

With reference to refrigeration again, the farmer has need for a much greater volume of refrigeration than the urban customer. Not only for his own use but primarily so he may supply foods to the urban centers in a much better quality than he can now do. Many of our fresh vegetables are not fresh vegetables but are merely substance in the form of fresh vegetables. All of the non-acid vegetables deteriorate very rapidly unless stored under refrigeration. Sometimes in the heat of the summer, and where these vegetables can not be moved quickly from the garden or field to the ultimate consumers, they may actually become detrimental to the health of the eater. Proper refrigeration will go a long way to prevent this.

Freezer units, to be used in connection with central storage locker plants and to supply the entire annual requirements for storage, are needed. Considerable work has been done on these, particularly in Texas, Oregon, and Washington, as well as other states. I am not sure that anyone would care to make a positive recommendation and stake his reputation on such recommendation at this time. I will, however, venture the opinion that the so-called package unit in this field will not meet the needs on account of the limiting factor—the width of doors in the existing homes.

These new units may probably take two forms: (1) Household refrigeration which has a built-in freezer storage compartment space to hold approximately a week's supply of frozen foods, with the user making use of central freezer storage plant for the storage of his food. (2) A freezer unit which will probably be more popular in the rural areas, having two compartment units, with one compartment a walk-in type for storage of foods and meats just above the freezing point and an additional compartment for the freezing and storage of a year's supply of food. My opinion at this time is that the cold storage room, having a capacity of 150 or more cubic feet, is desirable, and for the freezer space a capacity on the order of 8 to 10 feet per person will probably be required.

Probably one of the most needed and little used operations on the small farm is that of feeding forage crops as silage. There are probably two reasons for this: (1) The present necessary investment in cutting and filling equipment, and (2) The lack of properly designed silos for small herds. Practically all livestock, including poultry, can be profitably fed silage during the winter months, and, in many areas, during the dry weeks in late summer. Perhaps a study of the conditions that must be met in the

(*Continued on page* 108)

A Tentative Job Valuation Plan

An approach to the determination of the relative order of importance of work performed by various classes of employees in electric utility companies up to and including the first line of supervision.

By Herbert M. Sharp

Personnel Coordinator, Niagara Hudson System

DISSATISFACTION among employees regarding wage rates usually stem from one or the other of the following causes:

(a) The general belief that wage rates for all types and grades of work are too low in comparison with wage rates paid in the particular community or elsewhere in the particular industry. The usual result is a demand for a general wage increase.

(b) The belief on the part of certain employees that inequalities exist within their own Company's wage structure. They believe that certain jobs are not as well paid as others considering the character of the services rendered.

It must be realized that whenever a strong conviction is held by a substantial group of employees that intra-company inequalities exist, it will affect employee morale detrimentally. Forward-looking employers, if convinced that such inequalities actually do exist are just as desirous of eliminating them as are the employees themselves. The real difficulty is in reaching a meeting of the minds as to what inequalities actually exist. Any attempt to correct the alleged inequalities by "horse trading" methods may create new and greater inequities within the organization in which case the remedy is worse than the disease. The ensuing discussion relates primarily to the problem of developing rational techniques for handling such situations on a collective bargaining basis. It aims to correct inequalities and therefore bears on the problem of general wage increases only in a partial way.

It is obviously impossible to establish fair and equitable wage rates for the various types and grades of work unless some criterion or basis of judgment is established to determine what is really fair and equitable. When employer and employee representatives meet in collective bargaining negotiations for purposes of eliminating inequalities in the wage structure and each representative has only his own vague, indefinite and perhaps variable standard of judgment to guide him and no two standards of judgment are the same, agreement is difficult to reach. Such a procedure is about as effective as that of asking the same group of individuals to determine the weight of a hundred different physical objects of varying size and material, at the same time depriving them of scales with which to weigh them.

It is a fact, unfortunately, that there is no known method of "weighing" or evaluating jobs with mathematical precision and probably there never will be inasmuch as judgment must be exercised at every step in the job evaluation process. This merely emphasizes the practical necessity of establishing standards of judgment or measuring scales as aids in "weighing" or evaluating each element of job content that has any significant bearing in the determination of fair remuneration for services rendered. Such standards of judgment are usually referred to as job evaluation plans.

Despite the apparent advantages of well conceived job evaluation plans and the widespread acceptance of them throughout industry in general, it is not uncommon to encounter opposition to the idea, not only on the part of employees, but by management representatives as well. As to opposition based on opinions that such plans are impracticable, it seems safe to say that if agreement cannot be reached between employees and employer on the establishment and application of standards of judgment for evaluation purposes, it would be even more difficult to reach agreement as to wage rates for the various types and grades of work when there is absolutely no agreement as to appraisal methods. After all, there is little to be lost and possibly much to be gained if all concerned collaborate in a sincere effort to rationalize procedures for making adjustments in the internal wage structure.

Before any job evaluation plan can be accepted as a satisfactory device for determining fair and equitable wage rates, the following conditions must be satisfied:

(a) The plan must be sufficiently comprehensive to yield substantially identical results when several competent and unbiased individuals or groups of individuals, working independently of each other, rate the same series of jobs.

(b) The relationship between rating scores and wage rates must be such that the final results will be consistent with the general wage pattern of the industry.

There is no claim that the plan herein discussed fully meets the above requirements. It is tentative and is offered as a first step in the process of developing a satisfactory technique. It is not the type of project that can be carried to a successful conclusion through the efforts of any single individual. On the contrary, it should represent the combined efforts of duly appointed representatives of all concerned. It is a foregone conclusion, however, that it will come to naught if such representatives take a narrow or biased viewpoint and insist upon special dispensations for the particular groups they represent. It calls for collective bargaining on a high plane —collective bargaining among a group of unprejudiced individuals who have sufficient vision and foresight to realize that due consideration must be given to the valid claims of all concerned.

The first step in the procedure is to prepare comprehensive job specifications for each type and grade of work performed by the employees. The plan herein discussed contemplates an ap-

praisal of the *relative value* of each job on the impersonal basis of actual job requirements as set forth in the job specifications without reference to the qualifications or limitations of present incumbents. Each job is analyzed with due consideration to the following factors because they are the elements that influence wage rates depending upon the degree to which they are present in the overall job content:

Item A—Educational Requirements.
Item B—Practical Experience and Acquired Skills.
Item C—Initiative, Judgment and Analytical Ability.
Item D—Seriousness of Mistakes.
Item E—Responsibility for Safety of Others.
Item F—Personal Hazards.
Item G—Supervision of Other Employees.
Item H—Physical Effort
Item J—Mental Effort.
Item K—Working Conditions.
Item L—Inter-Departmental and Public Contacts.
Item M—Work Schedules.

Each factor is divided into a number of sub-factors for which descriptive statements have been written to indicate the varying degrees to which that sub-factor may be present, depending on the job being rated. A numerical rating score is assigned to each of these sub-factors. (This system is illustrated by the accompanying schedule for Educational Requirements—Item A of the above list of factors.) If in rating any particular job, the descriptive statement of any sub-factor does not meet the job specifications exactly, the rating score may be shaded upward or downward by assigning a plus or minus value to the score. The total rating score for each job is the summation of the individual rating scores selected for each factor. Three plus values or three minus values are considered to be equivalent to one full rating point.

The final score is not in direct proportion to the dollar value of the job. The rating score simply indicates the pay group to which the job should be assigned. The actual wage schedule is so designed that the ceiling wage rate applicable to any given pay group is approximately 95 per cent of the ceiling wage rate of the next higher pay group or approximately 5 per cent higher than the ceiling wage rate of the next lower pay group. Thus, a difference between two jobs of one full unit of rating score indicates a 5 per cent differential in basic wage rates for those jobs. Similarly, a difference between two jobs of two full units of rating score indicates that the wage rate for the higher job differs from the wage rate for the lower job by two successive intervals of approximately 5 per cent each. With these limitations, the actual wage rates assigned to each pay group must be such as to produce a wage structure consistent with the general wage pattern of the industry as determined by wage surveys covering a variety of key jobs. If, for example, this rating plan indicated that a groundman should receive a wage rate within 10 per cent of that of a top grade lineman, and it was determined for the rest of the industry that groundmen as a rule were paid only 60 per cent as much as top grade linemen it would indicate errors in the original assignment of rating scores to one or more of the factors included in the rating plan. By trial and error these assigned scores for each factor would be adjusted until they finally yielded results consistent with the general wage pattern of the industry not only for the line department, but for the various job series in other departments.

Assume for the sake of argument that employee representatives would be inclined to be ultra liberal in the assignment of rating scores with the expectation that such action will result in higher wage rates, and that management representatives on the other hand would be inclined to be ultra conservative in an attempt to offset that tendency. It makes little or no difference in either case providing the same degree of liberality or conservatism is used throughout the rating process. Suppose, for example, that the final rating scores selected by em-

ITEM A—EDUCATIONAL REQUIREMENTS

Note: **This factor measures the amount of theoretical knowledge and general mental development an employee should possess, but which cannot be obtained as an incidental result of practical experience on the job. Such knowledge is ordinarily obtained through formal academic training, extension courses or home study. This factor is not intended to measure manual skills, proficiency in operation of particular equipment, or detailed knowledge of plant layout, policies or procedures peculiar to work in this company.**

FIRST DEGREE—RATING SCORE 0

Requires only sufficient mental development to pass ordinary literacy tests.

SECOND DEGREE—RATING SCORE 1

Requires a working knowledge of simple arithmetic through decimal fractions and the general level of mental training ordinarily acquired by grade school education.

THIRD DEGREE—RATING SCORE 2

Requires a good vocabulary, proficiency in grammar, rhetoric, mathematics, elementary electricity, thermo dynamics or other science of the general scope and magnitude ordinarily acquired by a high school or trade school education.

FOURTH DEGREE—RATING SCORE 3

Requires, in addition to high school or vocational school education or equivalent, a moderate amount of specialized theoretical knowledge acquired by home study, extension courses or formal academic training in some minor phases of engineering work, law, economics, accounting or business administration.

FIFTH DEGREE—RATING SCORE 4

Work is of semi-professional character requiring, in addition to high school education, extensive theoretical training in some important aspects of engineering work, law, economics, accounting or business administration.

SIXTH DEGREE—RATING SCORE 5

Work is of a highly technical or professional character, requiring a complete college education or its full equivalent.

SEVENTH DEGREE—RATING SCORE 6

Work requires the employee to possess a sufficient degree of professional training and experience to qualify as an expert in one of the main branches of arts or science as in the case of the professional engineer, land surveyor, lawyer, *etc.*

ployee representatives were invariably two points higher than the rating scores selected by employer representatives. The *differentials between jobs* would be identical in both cases and would lead to identical conclusions as to whether or not some jobs were out of line with respect to other jobs. On the other hand, it is obviously impossible to determine correct differentials if various "pressure groups" are successful in having their particular jobs rated on a more liberal basis than other jobs. To obtain a high degree of accuracy, the evaluation of each job should be checked by several competent and unbiased individuals who are familiar with the work and whose own wage rates will not be advantageously influenced by the final appraisal of the particular job in question. It is certainly not the objective of this plan to create situations where some employees will receive more than they actually earn and other employees will earn more than they actually receive.

We have indicated heretofore that the addition of one full point to the rating score of a job increases the wage rate for that job approximately 5 per cent above what it would have been if that point had not been scored. In other words, a given differential in rating score between two jobs establishes a fixed *percentage difference* in basic wage rates for the two jobs irrespective of the general level of importance of the jobs in question. For example, a job with a rating score of 8 commands approximately 10 per cent more money than a job with a rating score of 6, while a job with a rating score of 24 similarly commands approximately 10 per cent more money than a job with a rating score of 22. This method of scoring is unique and, for reasons indicated below, is believed to have certain advantages over the usual practice where each additional unit added to the rating score represents a fixed dollar value.

Under the plan herein discussed, all shift employees receive the same *percentage increase* in pay over and above the rates that would apply to their respective jobs if performed only during the ordinary day time hours. Similarly, a top grade mechanic and his helper receive the same *percentage increase* in pay if both are required to perform their work under the same adverse working conditions. If the former receives 60 per cent more money than the latter when the work is performed under favorable shop conditions it seems logical to maintain the same differential if it becomes necessary for them to do the same kind of work under adverse working conditions although both should be compensated for the changed conditions. One wouldn't expect an army private to receive the same additional number of dollars per month when changed from domestic to foreign service that a four star general would receive for a similar change. As a matter of fact, each receives the same percentage increase for the changed "working conditions" which is fair and equitable and is the principle that is applied throughout this rating plan. It is not intended to imply that satisfactory rating plans cannot be developed under the usual scoring methods. It is offered as one which it is believed will work and should be tried out by both parties.

It is a generally accepted principle that greater accuracy results when a whole series of jobs is rated with respect to one factor at a time rather than from rating all factors for one job at a time. The former procedure enables the rater to appraise relative differences in job requirements more accurately than can be done solely from the descriptions applicable to the various sub-factors. As previously mentioned, if in any case the actual job requirement is somewhat different from the description of the sub-factor selected, the rating score should be shaded upward or downward by the assignment of a plus or minus value. In the final summation, three plus values or three minus values are considered to be the equivalent of one full point or unit. After rating scores have been assigned to all jobs for any given factor, the jobs should be listed in increasing order of rating scores for that factor in order to determine any inconsistency in the value assigned to any one job in comparison to all other jobs. If such final scores are the composite result of many independent ratings they will be more accurate than the scores selected by any one individual.

After all jobs have been completely rated, checked and crosschecked, the resulting total scores should be plotted on rectangular cross section paper against presently assigned pay groups. This will result in a so-called "scatter diagram," but unless this diagram indicates a very definite pattern which will permit the drawing of a straight line through most of the points, there is the implication that the rating plan is defective and should be revised. Even though a satisfactory straight line can be drawn through most of the points, the slope of the line may indicate that the differential between unskilled and highly skilled jobs is either too small or too great to match the general wage pattern in the industry as a whole, and this too would indicate the necessity of revising the plan. Assuming that no such difficulties have been encountered, if present pay groups have been plotted on the horizontal scale against rating scores on the vertical scale, points falling above the line will indicate jobs that have been underrated in the past. The horizontal distance between each such point and the average line indicates the extent to which that job has been underrated when judged by the newly developed standards.

From Electrification Needs

(*Continued from page* 105)

making and feeding of silage may result in the design of small silos and comparatively light equipment requiring small amounts of power. If this could come about, there is no doubt in my mind but that the great mass of small farmers could be sold this type of equipment, and I firmly believe that this one operation, coupled with adequate water pumping equipment, could very easily be made the foundation for electrifying the farms in our great bread basket.

The problem of home heating is still a serious one. Generally speaking, the farmer's manner of heating is limited to solid fuels, that is, wood, coal, oil, and bottled gas. We can not very well discuss the use of wood because the price varies so widely across the country. Ignoring it as a factor, we can make the statement generally that bottled gas is the highest, oil is considerably lower, and coal is the cheapest of all. Each has its distinctive advantages and disadvantages.

I think that equipment for the burning of oil and coal has been fairly well worked out but the sale of this equipment has not been aggressive. The bottled gas people are pushing their equipment very energetically, but because they can not very readily justify the cost of installation for cooking, refrigeration, and water heating, they are now selling their equipment for house heating and, of course, when sold for this, they attempt, and are taking on, cooking, water heating and, in some cases, refrigeration load as incidental to house heating. Studies indicate to me that almost without exception, this competition can be more than met by utilizing either oil or coal as a heating fuel and electrical equipment to do the other tasks, both as to first cost and annual operating cost.

In conclusion, may I again suggest that there is a tremendous opportunity for all concerned in the rural field, if we will adopt and carry out an intelligent study of the real needs of the great mass of farmers for electrical equipment, designed to meet these needs, and again I want to impress on you "needs" rather than "wants," followed by an aggressive selling program, which must be coupled with an adequate and satisfactory service plan.

Winning "Miss Public" With Good-Will Advertising

By Kimball I. Jack

Advertising Manager, Washington Water Power Company, Spokane

THUMB through the pages of your favorite magazine and at once you will perceive a host of institutional advertisements whose dramatic headline and illustration seize your attention.

Shift casual eyes from headline to copy and you may note that some of these good-will advertisements are boastful, others softly patronize the reader. Some may baffle students of sentence and theme with too much subject matter. Still others, more to the point, urge that you and I place personal problems aside and give ear to peculiar problems of the sponsoring firm. Seldom do good-will advertisements request money. Most carry subtle shafts from Cupid's bow which point not at the heart, but at the cranium. Like valentines printed on a calculator, perfumed yet ponderously statistical, many of them would woo with arithmetic a bashful or indifferent Miss Public to industry's side.

At once it may be surmised that this article is devoted to both advertisers and advertising, the subject itself more sacred than scripture to most executives. Seldom does one find an executive who hesitates to admit that he is expert on the subject of advertising. Being authority at making gears, computing kilowatts and appointing legal council, he could hardly admit otherwise. And now into his sacred premises a mere advertising man presumes to tresspass. The crossbow we carry is a personal gripe about advertisers.

In fairness at this point, it should be admitted that not all advertising which flutters through magazine space is seeking public sympathy. The firm has no political down-draft to disturb it, and no merchandise to sell, yet still wishing to give vent to corporate exuberance, it turns to institutional copy. Such copy keeps the corporate name alive, and it is also realized that timely words anent the war effort may bolster the home front.

So far so good.

To these exceptional advertisers and their little flirtations with Miss Public, we make no comment. It is expected that when peace returns with abundant radios and electric fly-swatters to sell, the advertiser will return to more familiar copy.

But to other firms that seriously indulge in the paid-ad method of winning friends, we now propose a most amazing declaration. The declaration does not hint that you cease institutional advertising altogether. Lilliput will merely chirp in Gulliver's ear. Indeed, with unfaltering presumption, an ordinary advertising man proposes to climb out from under his typewriter, and ignoring the colorful and perfumed array of institutional blooms about us, look up at the towering creature called industry and start our discussion as follows: Good-will advertising ain't entirely what it's cracked up to be.

Industry no doubt is indignant, deeply wounded. Its good-will valentines have been slanted to Miss Public for nearly twenty years, and the advertising agency has helped mold them. Now the sacred domain is deliberately desecrated and it is to be expected that someone will voice complete disagreement to the assertion that institutional copy is sometimes "whacky"; that the manager who dictates the jargon is often egotistical, and the advertising agency which encourages our printed and sometimes gaseous billet-douxs, overlooks opportunities of the physician, and drops in too often to peddle pink pills.

For hidden in past and present enthusiasm for good-will copy, several motives are apparent. The agency, for example, occasionally reveals a motive to which the polite client may never refer—a neat commission, usually amounting to 15 per cent. Far too often, trashy advertising is a profitable business transaction, the sale of an idea, rather than a palliative for industrial ills.

Also, in explaining approval for odoriferous copy, the profit motive casts a lengthening shadow toward media, but the shadow never quite reaches media because, schooled in realism as the publisher is, he cares little what is written in purchased space once it is contracted for. Secretly he sometimes groans.

Occasionally the advertising agency, which writes garbled copy, "passes the buck" of responsibility back to the client, saying that a headstrong "boss" overrides good judgment of the agency. Eve awakened to this same accusation when Adam cried, "Lord, the woman tempted me." Speaking off the record, the agency comments that institutional advertising opens for top executives the flood gates of self-realization. It is like this: Some executives have followed a lifetime of production, with little time for pretty speeches. Gruelling habit has made them uncommunicative, retiring, yet now at the top rung of the ladder, they long for a thunderous voice with which to proclaim success and personal achievements.

Institutional advertising gives them that voice. Into the sanctum sanctorum they modestly stride, benevolent men with excellent opinions of themselves—introverts by habit but extroverts at heart. They close the door, sink into an easy chair and lighting a huge cigar, envision themselves boldly in print, speaking to tens of thousands. With self-deference that becomes the top executive, they remind the public that here is a great and important humanitarian, a benefactor to the common man, and everyone should be extremely happy and thankful that factories are located in their midst.

Mimics by the score plagarize this progressive copy, running similar "look-at-big-me" announcements if only to avoid being left behind.

Remember, kind reader, no assault is being made upon advertising as a tool for business and industry. E'er this mild eulogy lulls the reader to sleep, a request may be made to increase the institutional advertising budget. In fact, we have planned it that way. The influence of purchased space, when properly used, is not questioned. Too many examples confront the layman, wherein advertising effort has sold both goods and ideas to doubt that it can do a job in the shortest time and at the lowest possible cost. The thing that drives rational minds overboard, is the careless use that many a business executive and many an agency make of advertising. They turn brag-

garts, psychopathic mumblers, jugglers and outright bores.

Examination of several hundred good-will ads in recent years, reveals that a curious classification is followed. The more recent institutional ads, designed to offset political encroachment, have specific issues to counter, and consequently they often do the job well. Of the remaining number, copy is largely devoted to *self*—statistics of self, history of self, personnel that waits upon self, occasional announcements of policy that affect the other fellow, two-bit congratulations to somebody, and an unparalleled avalanche of performance by self, which incidentally, is accomplished equally well by competitive industries.

Take, for example, a typical advertisement that was recently offered to 10 million readers in popular magazines. The illustration portrayed three soldiers, whom we all love. The headline, in so many words, reminded us that these soldiers were chalking off the Japs, for which service we are truly grateful. The purpose of the ad, after concentrated guessing, seemed an effort to preserve private enterprise. The concluding line asked that the reader buy war bonds. The signature was highly respectable. But the copy hit river-bottom. For slyly the reader was led from dead Japs through the most amazing discord of journalism one could possibly imagine, as follows:

"Three American boys kill Japs . . . we are proud of our boys . . . our factory supports the war effort . . . we have been in business 40 years . . . we are an important taxpayer . . . our products are the first line of defense to preserve the American way of life . . . buy war bonds."

Eliminating experts, we defy anyone to make a composite sentence to summarize these unrelated ideas. The chief executive undoubtedly could accomplish this feat, and hence the chief is automatically an advertising expert. But the humble reader, Miss Public, is helpless. The timid urge that people preserve the American way of life was bi-lateral innuendo, a nebulous line between lines, a wishful thought that could not possibly swim ashore and was therefore lost.

In an effort to determine what percentage of readers was convinced to the advertiser's viewpoint on free enterprise, the ad in question was reprinted on clean, white paper and three-hundred odd copies distributed to bus drivers who lounged about the shop after work; to housewives with nothing particular to do, and to city employees in their offices. The simple instruction was as follows: "Read this ad, then turn it over, face down, and in your own words tell what it says." Did the advertisement create good-will? Was Miss Public made aware that in return for industry's benefits, she was supposed to help preserve the system that gave her those benefits?

Hardly.

39 per cent of the 300 readers said the ad was attempting to stimulate public interest in the war effort, as "It's part of the war program"; "It's trying to speed up production"; "It's war information of some kind to keep us informed"; "It says for us to support the war better" "The army is telling us to enlist." No mention was made of the sponsor.

15 per cent said they did not understand its message, as: "The meaning is rather hidden"; "The picture is attractive, but it hasn't much to do with the writing"; "I am not sure, it talks about the war, but it is really about the company"; "I can't make it out"; "This ad has no meaning for me."

12 per cent said the ad was trying to sell war bonds.

8 per cent said it was trying to get people into war jobs.

8 per cent said the ad told of industry's contribution to the war.

3 per cent said it was an insurance ad.

15 per cent gave miscellaneous answers, as: "It's propaganda, and I never read it"; "Big business has too much money to spend"; "It tells us either to work or buy war bonds"; "The company is getting more business for after the war."

Observation number one may now be in order. It is this: If industry's problem is serious—this matter of winning public favor—why doesn't industry face Miss Public and talk frankly about her and his tomorrow? If the politician is out to steal his Tootsie, and keep her up 'til 2 A.M., why not take down the shooting irons and write an advertisement the public can understand? How is Miss Public to guess that in spite of stammering, posing on one leg, and lame-worded inference, management wants his valentine to point out that an organized movement is afoot to steal economic control from the hands of free men? That it is industry which has made, and will continue to make, the best possible contribution to public happiness?

It is not unkind to hint that if a sixth-grade boy was asked to write such an essay about horses and 92 per cent of the class said he wrote about alligators, the teacher would be justified in "flunking" him. He would hang his head in shame. Clarity of expression, coherence, singleness of thought are required of the most elementary student of English. After that, even with English at its best, the public is none too bright in interpreting what it reads.

We have in this nation some 18,000,000 people whose intelligence level is not above the average sixth-grade boy. Fourteen per cent of our population is rated with an I. Q. below 70, and at that point begins the mentality of the moron. Surely it is only wishful thinking to hope that an advertisement featuring pretty girls, whom everyone admires, or one about soldiers, with whom all are concerned, will transfer the affections of people for these objects to the remote and often discredited name of a corporation. Especially is this true, if the copy presents to feeble and drugged brain cells, six or seven entirely unrelated subjects in the same breath.

Consider another good-will advertisement run in popular magazines, which by letter of transmittal, was purported to prove that a specific company was contributing to the war effort. The illustration and headline whispered endearingly about the "little woman" waiting behind the cottage door, but the copy drifted to outright statistics, and ended with the usual appeal to buy war bonds. In this instance, the ad was presented to college students first, and needless to say many upper classmen were completely baffled. The illustration caught the eye, all right, but the copy lured them from the trail. They sniffed like bloodhounds, then made a wild guess as to what the ad was trying to say. One out of three missed the boat, and of this 30 per cent which failed to grasp accurately the main idea, 11 per cent, befuddled though college-bred, were totally wrong. They talked of war bonds, and said the ad urged them to pitch in and help.

Advertising that is overcomplicated, wandering, not to say windy, does not pass muster with college intellects, much less with millions of disinterested, preoccupied and outright stupid people who are, nevertheless, very human and entitled to one vote. Industry's approach to a profound subject—winning friends for American industry—seems to have been based on a superficial hope that the public has the same interest in corporate affairs that management has. Wishful thinking seems to be substituted for investigation; clever artwork for sound criticism, and tricky headlines for human understanding. What's worse, this situation exists despite the fact that unless deliberate effort to obtain good-will is more successful than during the past ten years, prosperity of both agency and clients could easily terminate. That is a bald fact, and it justifies open comments, and a conclusion as follows:

Our institutional advertising is too complicated. It needs simplification.

Furthermore, it very often talks about the wrong thing.

Indeed, one is inclined to become extremely satirical when so many advertisers take the stand that "good-will," in a piece of copy, like carbonated gas in a bottle of beer, cannot be seen but nevertheless must be there. One can hardly understand how topflight executives, having years of experience in a competitive world, fail to question the advertising agent's broad statement of fact that an extremely hard-shelled and indifferent public can be wooed with so-called "educational" advertising. Management should suspect that when one attempts to lead Miss Public to the altar with nothing more substantial than "education," Miss Public may have reactions of her own. Native shrewdness should hint that if the manager wins personal friends by following commonsense principles, it is only logical to suppose that this same procedure may well be followed in good-will advertising.

Institutions may change. Their policies and appearances may change; their personalities and products reshape themselves, but it is well to keep in mind that human reactions remain constant. Mass man responds with the limited basic emotions which nature has given him, and there is no laboratory equipped with electronics by which we may invent new reactions for him. If the consumer frets about security—the public's chief worry today—it is because he recognizes some situation that endangers him. If he is denied social approval, participation, or possessions and grows angry at business it is because he expected more immediate realization of his needs, at the hands of business, and someone seemed to have fallen down on the job.

The trouble with most institutional advertisers is that no matter how rational the motive, the reader is compelled to react to these business overtures according to a limited number of emotions, none of which are intellectual. Executives who are highly intelligent, too often think that their own thrill of achievement reaches like a halo to include others. Executives cannot seem to understand that their own elation, which is a very proper emotion under certain conditions, may not transfer itself to the consumer who is emotionally upset with more urgent problems; that the grief which a consumer feels, the fear or anger he expresses, the appetite he would feed, have also been with him since history first dawned. Mass man is driven to react to outside stimuli by his own momentary needs. He is ever attempting to realize his own possibilities, and woe to the organization that purposely interferes, and phooey to that organization which seems blind to his desires.

The business organization may try to divert him from his course, may puff and blow, turn handsprings to divert the reader's attention to problems of taxation and kilowatts, but be it reminded that a bee under the workman's blouse stirs him more than does the invasion of Europe, much less corporate worries. Man's desire for property and possessions, a happy home and family, power and position, social approval and recognition—these unrelenting social drives are the controlling factors in his emotional expression. They control him when he reads an ad, and when he votes.

Recognizing the consumer as he is, a question is now asked in all seriousness. Should the leader of a corporation not talk about the consumer's interests rather than his own? Is it not wisdom to talk in institutional copy about security to the man who feels insecure? Can it not be set down as fundamental that the institution should never be given the limelight, or the manager refer to his own products or his own predicament, save when, and only when, his product or his policies favorably affect the consumer? Merchandise is sold in such manner. The manager points out how his product will benefit the buyer. "Enhance your loveliness by wearing Dippy gowns," he says Yet in matters of institutional advertising, our executives and too many an agency ask the consumer to vote for this or that philosophy because the factory may pay a larger tax. It is like asking the buyer to purchase Dippy gowns so that the seller may profit to the extent of $11.98.

If themes of consumer interest are carried out—man's opportunity under free enterprise; his relief from taxes; recognition the common man receives; his participation in the economic structure, his chance of a happier future, we daresay that the present institutional advertising budget will seem inadequate, even to the reader. For he who anxiously scans the page in his own interest, who reads about himself, can never read enough. Nor will he complain as to the cost. What's more, with political usurpation threatening American institutions, and with the consumer turning to government for an answer to his needs, industry may well double the advertising budget which, backed by real and tangible effort, will assure the common man that business is concerned with his problems. Indeed, it is only because of this fundamental neglect that industry in years past has lost caste with the multitude it serves.

Admitted that in recent months the pendulum seems to have swung more favorably to business. This condition, however is due to the fact that mass man is lazy regarding yesterday's annoyances, and he chafes under war curtailments today. The question industry must ask itself is this: Just how permanent are today's resentments against government? Is it not logical to suppose that a normal environment will produce normal problems, and with the recurrence of yesterday's annoyances, a familiar emotional attitude is likely to return?

The very shadow of this reality should cause business and industry to set houses in order and then spend what advertising money is needed to fully inform the public as to where industry stands. Instead of boastful copy, sly, misleading headlines, instead of patronizing and unintelligible advertising messages, the consumer needs to be reassured right now, through institutional advertising, that industry is zealous in its efforts to help him realize his personal and psychological wants. Some advertising agencies admit that the institutional problem is relatively new to them; that much improvement in copy is possible. Others will forever remain blind.

The chief executive, therefore, may appoint himself company realist and see to it that his advertising is really shaped to create good will. This he cannot accomplish if he insists upon talking about himself.

He can only succeed by forgetting his ambition to "educate" and join hands with the consumer to give, not only good service at low prices, but also to show a real interest in helping him to reach mental objectives, which in a modern world are vital indeed. Until human nature can be modified, it seems pointless to talk to the masses about anything which does not directly affect them. If industry cannot reshape its services, policies and its very survival to this end, and if industry cannot see the need of informing the public accordingly, it is certain that government will take the lead. At this point, industry has the best chance to reach the public. Its consumer benefits defined in terms of merchandise and social services, and a good-will advertising program which tells the consumer of these things to come, should go forward immediately.

Artificial Respiration and Mechanical Resuscitators

By W. R. Smith

Past Chairman, EEI Accident Prevention Committee, and Resuscitation Sponsor for the Committee

THROUGHOUT the years since the investigations were carried on by the several resuscitation commissions under the chairmanships respectively of Dr. W. B. Cannon, Professor of Physiology, Harvard University, Dr. S. J. Meltzer, Rockefeller Institute, and Dr. Cecil K. Drinker, then Associate Professor of Applied Physiology of the Medical School of Harvard University, in the reports of which endorsement was given to the prone pressure method of resuscitation as recommended by Sir Edward Sharpey Schafer, F.R.S., in 1903, this method has been the standard technique throughout the electric light and power industry.

The reasons for the conclusions reached by these commissions are ably set forth in their reports. Of especial significance in connection with the adoption by all national organizations and associations, among which was the National Electric Light Association, predecessor of the Edison Electric Institute, of the prone pressure method as the method of choice were such considerations as:

(1) Ease with which it can be learned.
(2) Readiness of application without delay.
(3) Adequacy of ventilation of the lungs.
(4) Promotion of movement of congested blood in the abdominal area toward the heart and into circulation.
(5) Resuscitation can be continued by one person, if necessary, for the periods usually required.

From the standpoint of the electric light and power companies, concerned as they must always be with the possibility of electric shock, the manual techniques of the prone pressure method and its adaptation to the special need of the electric industry—pole top resuscitation—are of great significance as in such cases the reduction of time to the starting of artificial respiration is of utmost importance. When artificial respiration is required because of carbon monoxide poisoning it is now considered of equal importance to administer oxygen (93 per cent) with carbon dioxide (7 per cent) during artificial respiration in order that the poison may be the more quickly removed from the blood. For such purpose an approved type of inhalator is the recognized and preferred device.

Over the years since the several commissions recognized the merits of manual methods, especially the prone pressure technique, and disapproved of the use of mechanical resuscitators of the pulmotor type, there has been much discussion concerning the merits of various newly developed devices for use in the field by those who are called upon to render first aid to persons requiring artificial respiration. The reports of the above commissions, subsequently supported by the opinions of leading physiologists and others in the medical field, have guided the opinion of the electric light and power industry and have lead to the conclusion that such mechanical resuscitators are neither necessary nor desirable for field use. On the contrary, manual methods are preferred and are deemed in every respect more desirable for all first aid cases requiring artificial respiration.

Of interest in the above connection are the recent announcements on the part of the Bureau of Medicine and Surgery of the United States Navy* and of the United States Maritime Commission, promulgated by the Division of Shipyard Labor Relations as "Shipyard Health and Safety Bulletin No. 14." Both of these actions are predicated on the following resolution which was unanimously adopted by the Medical Division of the National Research Council on July 7, 1943, at a meeting held in Washington:

"WHEREAS this Conference has been requested to consider, and to express an opinion on, the advisability of the use of mechanical, artificial respiratory devices by the armed forces and other federal agencies of the United States, and

"WHEREAS manual methods of supplying artificial respiration are admittedly effective when properly applied, but, nevertheless, have certain obvious limitations, and

"WHEREAS the Conference is cognizant of the fact that the Council on Physical Therapy of the American Medical Association has accepted certain of these devices as mechanically adequate and has stated certain qualifications regarding their use by trained personnel, be it

"RESOLVED that this Conference has come to the conclusion that manual methods of artificial respiration are effective, can be applied without delay or dependence upon mechanical equipment, and by personnel easily trained. Manual methods are the methods of choice, and this is the Conference's considered opinion.

"The Conference is therefore led to approve the utilization of several manual maneuvers for artificial respiration (including Schafer, Sylvester, Eve and their modifications) and where these are impossible or subject to delay, the direct mouth-to-mouth or mouth-to-nose inflation.

"The Conference furthermore approves the employment of very simple mechanical devices where manual methods are not feasible or where oxygen is needed and available. The Conference would specify that these mechanical devices be of the following characters:

(1) As simple mechanically as possible.
(2) As small and light as possible.
(3) Provide only positive pressure with limit of 10mm Hg (5½ in. water).
(4) Provide no negative pressure.

"The Conference furthermore has

"RESOLVED, That this opinion is not to be construed as a derogation of the importance of training in first aid and manual methods of artificial respiration."

The above action supports and is in agreement with the opinion of the Accident Prevention Committee of the Edison Electric Institute and its predecessor organization of the National Electric Light Association that manual methods are favored together with the accompanying use, as required, especially for cases of carbon monoxide poisoning, of inhalators which supply appropriate mixtures of oxygen and carbon dioxide but do not attempt to blow air into or suck it out of the lungs.

* Science News Letter, January 8, 1944, Page 22.

Depreciation Accounting As Applied to Public Utilities

By Samuel Ferguson
President, The Hartford Electric Light Company

EDITOR'S NOTE: This article is abstracted from the book of the same title, by Mr. Ferguson, recently published by the Case, Lockwood & Brainard Co., Hartford, Conn. The reader's attention is also directed to the article "The Significance of the Term 'Net Property' As Applied to Public Utilities," published in the January, 1944, issue of the E. E. I. BULLETIN, pp 6-10.

I—PREMISES

A VERY considerable amount of confusion exists from the fact that students of depreciation accounting have been accustomed to use the word "depreciation" in two different senses without making plain which sense is under discussion.

Depreciation in its economic sense is a noun and (as defined in the dictionary and commonly understood) denotes loss of initial characteristic such as appearance, usefulness or value. It is factual.

Depreciation in its accounting sense is an adjective denoting an orderly process of providing for a recoupment of such loss.

Much of the existing controversy arises from an effort to treat the word in one sense as synonymous with the same word in the other sense. The Supreme Court has been most explicit that factual depreciation must not be confused with theoretical estimates or with provision for recoupment of cost and has made plain its recognition of the two differences in meaning.

Fundamental Premises

In any discussion of the word depreciation in either sense, whether as noun or adjective, there are certain fundamental premises that are generally accepted and must be taken into account in any attempted solution of the depreciation problem. These, as applied to utility properties, may be listed as follows:

1. The useful life of all physical property is finite. Nothing will last forever.
2. The facilities used in rendering service to the public are just as truly consumed as are the supplies entering into the production of the product and charged to operating expense.
3. For convenience, the record of the facilities consumed over a long period is treated in the capital accounts while the record of the supplies consumed is treated in the operating accounts.
4. Failure to recognize and provide for recoupment of the cost of facilities consumed results in an impairment of capital and in an untruthful balance sheet.
5. While maintenance may delay the action of some causes of depreciation it cannot cause either its elimination or its material reduction if the Supreme Court definition of depreciation in the Lindheimer Case[1] is accepted, as many factors are not in any way affected by maintenance.
6. The retention of initial efficiency does not constitute absence of depreciation. The advance in the art and the availability of better apparatus is just as much a cause for retirement of the old equipment as is its own deterioration in efficiency.
7. The consumption of plant should be reimbursed by the consumer just as surely as should the consumption of supplies.
8. Depreciation in its economic sense is not directly a function of time since many causes for retirements occur quite independently of the passage of time.

Secondary Premises

There are also certain other premises not so fundamental which, although controversial in the past, are today generally accepted, namely:

1. That the funds necessary for the recoupment of cost of facilities consumed should be provided by those using same rather than for the payment to be postponed to future customers even though the improved efficiency of the new facilities would make such recoupment possible out of the savings to be effected.[2]
2. That the collection of these "recoupment" funds should be spread as uniformly as practicable in annual charges in order to avoid widely fluctuating expenses from year to year which might have to be reflected in correspondingly fluctuating rates.[3]
3. That if these funds or any part thereof are collected from customers in advance of a corresponding amount of factual depreciation, equity demands that due consideration be given to the interest of customer in any disposition of earnings to be derived from such funds contributed in advance of corresponding loss.[4]
4. That in determining the annual amounts to be accrued for depreciation it is desirable that the greatest weight be accorded to the book record of the company in question and that consideration of so-called observed depreciation be minimized.[5]

Erroneous Premise

Unfortunately there has been wide acceptance of a further but erroneous premise to the effect that:

"In order that 'recoupment of cost' for discarded facilities shall be made by those in whose service they were consumed it is necessary that the service life of each unit of property or group of units be determined in advance; or in default of accurate predetermination the best possible estimate shall be made for the purpose of spreading such costs over such useful life of the facilities."

A not exactly parallel analogy would be to insist that a bank must know in advance how long each deposit will remain in its keeping; or at least the average duration of all deposits. This is exactly the erroneous premise made as to precautions to cover withdrawals of utility facilities.

It is true in the case of banks, as well as in the case of utilities, that a coincident call for withdrawals if of great magnitude would produce disaster; but our whole economic system is built upon the premise that as a general rule there will be no coincident call by bank depositors and that the maintenance of a reserve of liquid funds of a size determined by the regulatory banking authorities will be a sufficient safeguard against such disaster and will maintain the integrity of the bank. Certainly the same degree of regulatory control will maintain the integrity of the utility investment which has been dedicated to public service, without the effort to predetermine what is indeterminable.

II—PROPOSED METHOD OF DEPRECIATION ACCOUNTING

In place of indefensible arbitrary appropriations to the reserve and in place of equally indefensible and arbitrary assumptions as to service lives, a simple method of determining the proper annual accruals by use of a formula to be derived from the history and books of the company in question is proposed by the writer.

The objective of Depreciation Accounting may be simply stated as:

"A reasonable method of charging to expense (and therefore to the consumers) the cost of the physical property consumed in their service in such orderly fashion that those in whose service the property is consumed should pay therefor rather than to pass the costs on to future generations."

In accomplishing this objective there

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[1] Lindheimer vs. Ill. Bell Tel. Co. 292 U. S. 151. "Broadly speaking, depreciation is the loss not restored by current maintenance which is due to *all* the factors causing the ultimate retirement of the property."

[2] See Section V—Size of Reserve.

[3] See Sec. III—Sliding Scale Depreciation Charts.

[4] See Sec. VIII—Treatment of Depreciation Reserve.

[5] See Sec. IV—The Use of Company Accounting Records.

would seem to be two principles which it is essential to respect:

(a) Suitable rates shall be charged to maintain, intact and unimpaired at all times, the property dedicated to the service of the public.

(b) Until such time as the sums collected in advance of need for the maintenance of the integrity of the property are used for their intended purpose, it is essential that the equity of the customer in the earnings from same shall be recognized appropriately.

The method required to accomplish this objective, to respect these principles and to conform to decisions of the Supreme Court is extremely simple and can be concisely stated in conformity with the more detailed discussions in other sections, as follows:

(a) That the assets of the depreciation reserve shall be invested in property or securities only with approval of the regulatory authority and subject to such reasonable conditions as may be imposed.[6]

(b) That the regulatory authority shall specify, as the condition of granting approval for temporary investment in property extensions, the rate of interest to be credited to the reserve out of the permitted return, thus assuring to the customers their equity in earnings to be derived from the assets of the reserve.[8]

(c) That the company shall designate—within maximum and minimum limits specified by the Commission—the size of the reserve[7] which it considers appropriate in relation to the size and character of the property; which size once selected shall not be subject to change without hearing and Commission approval.

(d) That each company shall file and invariably use without departure, such sliding scale formula for annual accretions to the reserve as will, to the satisfaction of the regulatory body, tend to create and maintain the reserve at approximately the specified figure.[8]

(e) Insofar as the original cost of property used and useful in the service of the public is of evidential value in any rate base determination, the undepreciated first cost shall be used; since the customer equity in the earnings from payments made in advance of need is cared for by the appropriate (see (b)) accretion to the reserve out of permitted earnings.[9]

While each of these statements might be discussed here in detail, this is not necessary to an understanding of the proposed method and the reader will recognize the text and premises pertaining to each in other sections.

On the Balance Sheet it is proposed to treat the Depreciation Reserve exactly as any other reserve, viz., a preparation to meet an approaching indeterminate liability, but with four important restrictions, namely:

(a) That the assets of the depreciation reserve shall be invested in property or securities only with explicit permission of the regulatory authorities.

(b) The reserve must be conserved for the purpose which justified its collection and the directors are prohibited from transferring this reserve to surplus in the way that they may transfer other reserves which, for various reasons, have been set up out of earnings.

(c) Inasmuch as it is the *property*[10] which is the beneficiary of the reserve, a proportionate part of the reserve must also be transferred with any sale of items of physical property.

(d) The depreciation reserve shall never be allowed to become negative.[11] If, by reason of insufficient reserve, the book value of properties retired by reason of abnormal conditions (illustration—San Francisco earthquake) in any year exceeds the amount of the existing reserve then any deficit must be made good by a transfer from surplus. If surplus is insufficient, the capital is impaired.

III—SLIDING SCALE DEPRECIATION CHARTS

The practical operation of the plan outlined in the foregoing section for depreciation accounting is simple and automatic.

1. The Commission designates the limits within which the size of the reserve should be specified by the Company.

2. The management of the Company studies its records, forecasts of the future, exposure to risks as well as other factors and reports to the Commission the per cent of fixed capital at which the depreciation reserve should be held and gives the reasons.

3. The management figures from its records[12] the average annual accrual (in per cent of fixed property) to the reserve which would have tended to maintain the reserve at the per cent designated by 2 above. This average accrual at the desired per cent reserve is designated as the "critical" point. This "critical" per cent accrual would have resulted (over the period of years of the company's history used in its determination) in the desired reserve, provided the reserve was as desired at the start. It would not, however, bring a lower reserve to the desired level nor prevent a long-continued drop in the reserve after an exceptionally large retirement (such as might be produced by some disaster) or after an exceptionally large addition to fixed capital, but in spite of these variations the reserve would eventually return again to the initial per cent of fixed capital.

4. In order to reduce the variations and hasten the restoration of the reserve to the desired average it is only necessary to vary the annual accrual in an inverse ratio to the size of the reserve and this variation need not be so great as to affect materially the consistency of different accounting periods.

For example let us assume that the Commission decided less than 10 per cent would be inadequate and more than 30 per cent would be excessive and the management presented studies which showed 20 per cent of fixed capital to be a reasonable average reserve to adopt so that the cost of serving present customers would not be passed on to future customers and to assure that the reserve would never be pulled down to zero by exceptional conditions of plant increases and decreases.

Assume further that the records of the company (used as explained in Section IV) give a "critical" point of 1.9 per cent for a 20 per cent reserve.

Refer to Chart I where an inverse proportion formula is shown graphically. Any sloping line through the critical point would represent a sliding scale formula for tending to maintain an average 20 per cent reserve. The nearer to vertical the line is, the faster the correction for deviation from 20 per cent reserve but also the greater the variation in annual charges. Conversely the nearer to horizontal the line is, the less the variation in annual charges but also the slower the correction of any deviation from the desired reserve.

It is desirable that the annual charges shall not vary widely as the objective of depreciation accounting is an orderly provision for the recoupment of cost of property retired, which by nature occurs in no orderly manner.

For this particular example, what a road builder would call a 10 per cent slope was selected. That is, the total annual charge will increase by 10 per cent of the amount that the reserve (in per cent of fixed capital) may be below the designated 20 per cent and conversely will diminish by 10 per cent of the amount that the reserve may be above the designated 20 per cent. If, for example, the fixed capital should be increased one-third by a large addition to the system then the reserve which had been 20 per cent of fixed capital would drop to only 15 per cent of fixed capital. This is 5 points below the designated reserve, so the annual accrual would increase 10 per cent of 5 or .5 per cent making the new annual accrual 2.4 per cent instead of 1.9 per cent as can be read directly from the chart.

The mathematician would designate this particular sliding scale formula as $Y = 3.9 - 0.10X$ where Y is the total annual charge in per cent of fixed capital (vertical scale) and X is the reserve in per cent of fixed capital (horizontal scale).

If conditions make it desirable, it is entirely practical to confine the annual accruals between maximum and minimum limits.

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[6] See Section VIII.
[7] See Section V.
[8] See Sections III and IV.
[9] See Sections VIII and IX.
[10] The Supreme Court in the Lindheimer case said:—"In determining reasonable rates for supplying public service, it is proper to include in the operating expenses, that is, in the cost of producing the service, an allowance for consumption of capital in order to maintain the integrity of the investment *in the service rendered.*"
[11] It would be within the power of the regulatory commission so desiring to rule that the reserve must never go below some minimum figure higher than zero. However, in such a case the interest of the public would not be furthered by any regulations which would strain the credit of the company at a time of exceptional destruction when it would need cash for rehabilitation purposes.
[12] See Section IV.

The "critical" point in this formula can be kept up to date each year by dropping off the data of the earliest year and including the same data from the latest year as it becomes available. The critical point will usually change slowly.

If over a period of years any unforeseen development appears to indicate as desirable a change in the size of the reserve either the Company or the Commission can start proceedings for a redetermination.

The accompanying charts are of interest as showing the results of experience with the sliding scale depreciation formula in use by The Hartford Electric Light Company.

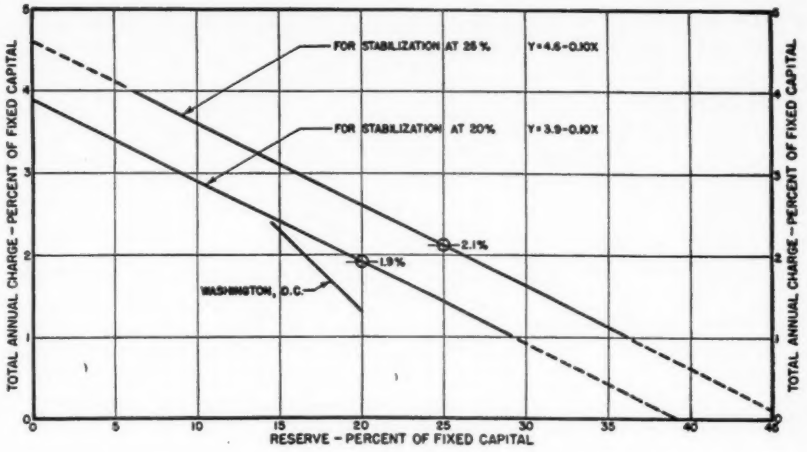
FOR STABILIZATION AT 25% Y=4.6-0.10X
FOR STABILIZATION AT 20% Y=3.9-0.10X
2.1%
1.9%
WASHINGTON, D.C.
TOTAL ANNUAL CHARGE - PERCENT OF FIXED CAPITAL
RESERVE - PERCENT OF FIXED CAPITAL

Chart 1

Chart 1

This chart shows the formula that will tend to maintain the reserve stable at 25 per cent of the fixed property under the conditions of property additions and withdrawals as have taken place in Hartford. Hartford has no particular brief for the correctness of 25 per cent as against any other reasonable figure. It is probably rather high for a property of this type but, since the reserve had grown to 25 per cent before the stabilization formula was adopted, this figure was selected as the objective to be maintained, even though it is probably somewhat higher than necessary.

The slope of the curve, provided it passes through the critical point indicated thereon, is material only as affecting the speed of the return to 25 per cent when the reserve (through the accident of withdrawals or additions) has become different from the desired figure.

The annual amount to be accrued to the reserve in any year in Hartford is read directly from the upper line, being 2.1 per cent if the reserve is 25 per cent of the fixed capital—correspondingly

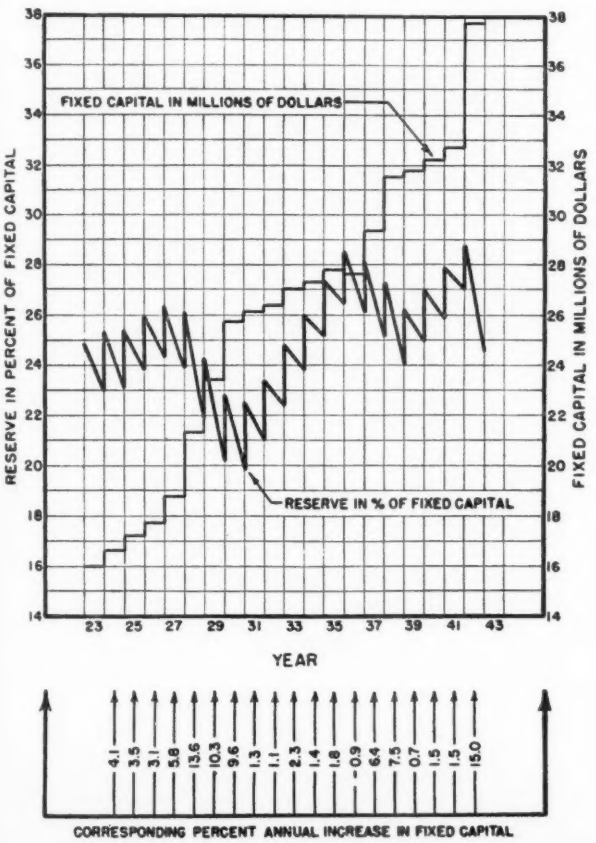
FIXED CAPITAL IN MILLIONS OF DOLLARS
RESERVE IN % OF FIXED CAPITAL
RESERVE IN PERCENT OF FIXED CAPITAL
FIXED CAPITAL IN MILLIONS OF DOLLARS
YEAR
4.1 3.5 3.1 5.8 13.6 10.3 9.6 1.3 1.1 2.3 1.4 1.8 -0.9 6.4 7.5 0.7 1.5 1.5 15.0
CORRESPONDING PERCENT ANNUAL INCREASE IN FIXED CAPITAL

Chart 2

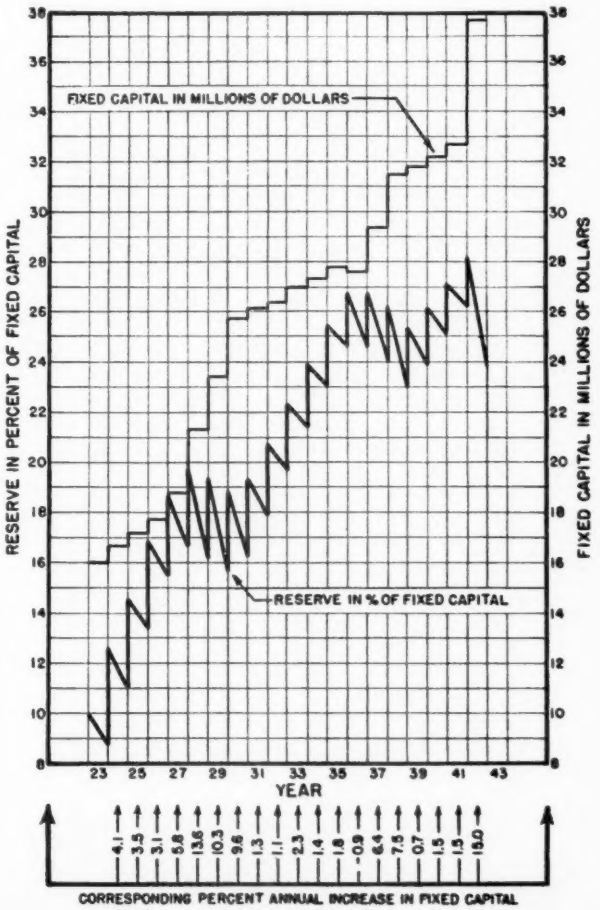
FIXED CAPITAL IN MILLIONS OF DOLLARS
RESERVE IN % OF FIXED CAPITAL
RESERVE IN PERCENT OF FIXED CAPITAL
FIXED CAPITAL IN MILLIONS OF DOLLARS
YEAR
4.1 3.5 3.1 5.8 13.6 10.3 9.6 1.3 1.1 2.3 1.4 1.8 -0.9 6.4 7.5 0.7 1.5 1.5 15.0
CORRESPONDING PERCENT ANNUAL INCREASE IN FIXED CAPITAL

Chart 3

less for higher reserves and higher for lower reserves.

Indicated also is the formula of the Public Utilities Commission of the District of Columbia as applied to the Potomac Electric Power Company which, from rough inspection, would indicate a somewhat lower stabilization objective and a more rapid return to its objective figure.

Both in Washington and in Hartford the accrual is charged partially to expense and partially out of return in the form of interest on the reserve.

Chart 2

In this chart the assumption is made that there was a reserve of 25 per cent in 1922 and that the curve had been used continuously thereafter with the additions and withdrawals as shown on the books during the period. It is obvious that in the years of abnormally large additions the reserve would go below its objective and in those years when there were neither large withdrawals nor additions the reserve would tend to climb above the objective. It ends in the desired neighborhood now that additions and withdrawals are not of the excessive percentage magnitude of some of those years.

Chart 3

This chart is similar except for the assumption that in 1922 the reserve instead of being 25 per cent was only 10 per cent. This indicates that the formula not only tends to produce stability but also tends to build up a small reserve to the desired point.

IV—THE USE OF COMPANY ACCOUNTING RECORDS

Many attempts have been made to determine the size of the proper annual accrual from the *retirement* records of the industry. It is obvious, however, that the withdrawal record alone does not produce a reliable guide since, if the actual lives during the period of rapid industry growth and development are taken as the estimated service life of present investment, the figure is so high as to rapidly produce excessive reserves.

It is surprising that the two factors of "historical plant growth" and "historical withdrawals" have not more generally been used in conjunction as a means of determining a proper annual charge.

Regulatory bodies and industry executives are generally in agreement—though for different reasons—that the old idea of a 5 to 10 per cent reserve is inadequate as a conservative preparation to meet the inevitable needs. This leads us to the question of what is an adequate reserve and by what method can it best be maintained.

Postponing to a later chapter any discussion as to what constitutes an adequate reserve, let us now confine attention to the simple though hitherto unused method of determining from the company's books of account how large should be the annual accruals to the reserve on the assumption that on the average, over a period of years, it is desirable to obtain a reserve of any given percentage of the original cost of the fixed property—say 20 per cent for the purpose of illustration.

The average annual accrual to maintain a reserve at any selected percentage figure must be sufficient to:

1—Increase the reserve proportionately to increase in plant.

2—Cover the charges made to the reserve over the period.

Both of these figures appear on the books of the company.

The sum of these two amounts divided by the sum of the annual Dec. 31 fixed capital accounts over the period will give the arithmetical answer as to the per cent of fixed capital to be accrued anually to the reserve to fulfill the condition of producing a reserve which at the end of the period will be the same as the initial figure.

The following examples taken from the books of the Hartford Electric Light Co. are illustrative of this determination for objective reserves of 15, 20 and 25 per cent. The average annual accrual, or "critical" point, so found is used as a base for the sliding scale formula as described in Section III. (Table I, adjoining column.)

Accrual figures similarly obtained from the data of operating companies coincide generally with the order of magnitude of the figure which present-day judgment of both industry executives and regulatory officials feel to be a reasonable accrual to the reserve but have the advantage of being based upon historical facts, rather than upon any hypothetical supposition of the useful lives that may be expected of existing utility facilities.

The above-determined accruals are such that, if consistently used during the period in question, would have ended the period with the reserve at its initial figure. They would not, however, have created the desired figure in the first place.

To create the desired reserve and to correct for variations from the average additions and withdrawals in the period, all that is necessary is to vary this figure in inverse proportion to the size of the reserve. The slope of the line[13] representing the inverse proportion is immaterial except as affecting the speed of creation and the speed of correction of any variation in the size of the reserve from the desired figure which may have been caused by abnormalities in the additions or withdrawals in any one year. The line must however pass through the average accrual figure which is referred to as the "critical" point.

TABLE I

THE HARTFORD ELECTRIC LIGHT COMPANY
1927 - 1942

15% RESERVE:	
(1) Fixed Capital Dec. 31, 1942.	$ 37,680,000
(2) Fixed Capital Dec. 31, 1927.	18,775,000
(3) 15-Year Net Increase	$ 18,905,000
(4) Desired Increase in Reserve = 15% of (3)	2,836,000
(5) 15 Years' Withdrawals Less Salvage	4,349,000
(6) 15 Years' Total Accruals	$ 7,185,000
(7) Sum of Annual Fixed Capital Figures	428,489,000
(8) Then Average Annual Accrual Over the 15-Year Period Will Equal (6) Divided by (7) or 1.67 Per Cent.	
20% RESERVE:	
(1) Fixed Capital Dec. 31, 1942.	$ 37,680,000
(2) Fixed Capital Dec. 31, 1927.	18,775,000
(3) 15-Year Net Increase	$ 18,905,000
(4) Desired Increase in Reserve = 20% of (3)	3,781,000
(5) 15 Years' Withdrawals Less Salvage	4,349,000
(6) 15 Years' Total Accruals	$ 8,130,000
(7) Sum of Annual Fixed Capital Figures	428,489,000
(8) Then Average Annual Accrual Over the 15-Year Period Will Equal (6) Divided by (7) or 1.90 Per Cent.	
25% RESERVE:	
(1) Fixed Capital Dec. 31, 1942.	$ 37,680,000
(2) Fixed Capital Dec. 31, 1927	18,775,000
(3) 15-Year Net Increase	$ 18,905,000
(4) Desired Increase in Reserve = 25% of (3)	4,726,000
(5) 15 Years' Withdrawals Less Salvage	4,349,000
(6) 15 Years' Total Accruals	$ 9,075,000
(7) Sum of Annual Fixed Capital Figures	428,489,000
(8) Then Average Annual Accrual Over the 15-Year Period Will Equal (6) Divided by (7) or 2.12 Per Cent.	

[13] See Section III.

The simplicity and directness of determining the proper accruals to the reserve from definite recorded data is in marked contrast to the attempts to determine or estimate service lives by curves and mathematical formulas and forecasts of future trends.

V—SIZE OF RESERVE

In determining the size of a reserve which shall be accepted as adequate in relation to any fixed capital account there are several factors to which consideration must be given.

1. It must be sufficiently large to be never entirely depleted by such amount of withdrawals as may take place over any short period of years.

2. It must not be so excessive in size as to represent unnecessary collections made from the consuming public.

3. It must cover the depreciation which has in fact taken place.

4. It must, in addition, provide a reserve against the future liability for such depreciation (due to causes which are not progressively a function of time) as has not as yet taken place but which may suddenly occur at any time.

Commenting on these factors in the order given, it is obvious as to 1—that so long as the reserve is sufficient so that every recoupment of cost of facilities withdrawn can be made out of its funds (paid in by present and past users), there will be no back bills left to be paid by future users; and the premise that "facilities should be paid for by those in whose service they were consumed" will have been fulfilled. It is true, in case the abandoned property is replaced, that future consumers will have to contribute funds to provide a replacement of the reserve so used but this is no more than was done by present and past consumers in providing the initial reserve. The essential point is that the reserve shall be large enough to stay in the black regardless of the magnitude of withdrawals—otherwise surplus is in fact depleted even if the depletion be concealed by the use of suspense accounts.

If the reserve should go into the red, then there is a balance of the recoupment of cost to be paid for by future customers but so long as it remains in the black, the funds for recoupment of cost of facilities withdrawn have been contributed in full by customers using the facilities before the termination of their useful life. Hence, the necessity for a reserve large enough to be always in the black notwithstanding the most adverse circumstances that in all reasonable probability will ever take place.

On the other hand with respect to a limitation of size (Factor 2,), the Supreme Court in the Lindheimer case has been specific that the utility, under the guise of depreciation, must not collect excessive amounts for the purpose of financing plant extensions.

Factor 3—is an acceptance of the concept which underlies the "service life" theory insofar as it can be logically applied; i.e. to those causes of depreciation which are progressively a function of time together with any known obsolescence, inadequacy, etc. This acceptance involves the deduction of this particular amount in any rate base determination; or its equivalent through crediting interest to the reserve at the permitted return earned on the property as a whole.

The provision to be made (Factor 4) against future liabilities of unknown amount, unknown time of incidence and unknown diversity is most important but will vary with different companies under varying conditions. For instance, a small distributing company in a territory subject to hurricanes will naturally give greater mental weight to the hurricane possibility than a large New England company where this particular risk exists only to a lesser degree and is of far less frequent incidence.

All companies must be prepared to meet the loss, probably to be occasioned sometime to a greater or less degree, from fire, flood, hurricane, earthquake, obsolescence, inadequacy, action of governmental authorities and other causes that are not a function of time; but not all will happen at once and some may never occur in the course of 1000 years. A study[14] of all causes for past property withdrawals shows these factors, which are not related progressively to the passage of time, to have been responsible for 80 per cent of the total. This demonstrates the importance of this factor and makes appropriate the following note which appears on the balance sheet of many companies:

"The amount shown in this account is intended not only for depreciation of plant which has taken place to date but also is in part an advance preparation to cover depreciation which will occur in the future from causes which have not as of this date caused any depreciation of existing plant, such as hurricanes, floods, earthquakes, obsolescence, and other events which are not directly a function of time."

Inasmuch as the reserve figure thus shown in the balance sheet is not a statement of the amount of depreciation in fact existing at any given time but only a statement as to the extent that preparation has been made to meet a future liability of unknown extent and maturity, there exists a truthful disclosure of the status of the company at the time of report. This is not the case if the reserve purports to represent the depreciation which in fact has taken place since this amount can never be known until *after* the facilities have been retired. Books of account should not use estimates in the same manner as factual figures.

Because the size of the reserve adopted is of necessity more or less arbitrary, it is fortunate that, as outlined below, its size between quite wide limits makes very little difference in the necessary charges to expense which must be reflected in rates; and therefore it is appropriate that the regulatory bodies should set quite wide limits (say 10 per cent minimum, 30 per cent maximum) between which the company shall select and justify some specific figure which it proposes to endeavor to maintain over succeeding years. The objective figure once selected must of course not be changed except with permission and after the showing of due cause.

Factors affecting the selection of the size of reserve are:

(1) The larger the objective reserve as a per cent of fixed capital the larger must be that portion of the annual accruals which is required to maintain the desired relationship to fixed capital.

(2) That portion of average annual accrual which is required by reason of the "recoupment of cost" of withdrawals is wholly independent of the size of the reserve.

(3) The portion of the annual accrual chargeable to expense is smaller with large than with small reserves by virtue of the then larger portion of the accrual which is represented by the interest credited to the reserve out of return. This tends to offset the requirement caused by (1) above.

(4) Calculated results: For illustration of the inconsequence of size in effect on rates let us assume the interest to be paid on the reserve and credited to that account is at the rate of 3% and that the average withdrawals are 1½% of fixed property. Then the effects of different rates of growth of fixed property and different sizes of reserve are illustrated below. A reasonable range of reserves, 10%, 20% and 30% of fixed capital, has been selected in the illustrative examples and rates of growth of 2%, 3%, 5% and 7½%. The total accrual in each case must be sufficient to keep pace with the increase in fixed capital plus a coverage of the withdrawals. For instance with 2% growth and 20% reserve the total annual accrual must be 20% of a 2% fixed capital growth = .4% of fixed capital for growth plus 1.5% for withdrawals which totals 1.9%. Of this 1.9% that part supplied by interest on the reserves is 3% of 20 = .6% of fixed capital. Deducting this from the total accrual of 1.9% leaves 1.3% of fixed capital to be charged

[14] Study of Causes of Retirements of Electric and Gas Properties—Interim Report, Feb. 1, 1941. Prepared by AGA and EEI Subcommittee of Depreciation Committee.

to operating expense. In like manner the following table is calculated:

Effects of Size of Reserve and Growth of Fixed Capital

(a) 2 per cent of fixed capital growth annually

Reserve	Total Accrual	By Interest	By Expense
10%	1.7%	.3%	1.4%
20%	1.9%	.6%	1.3%
30%	2.1%	.9%	1.2%

(b) 3 per cent of fixed capital growth annually

Reserve	Total Accrual	By Interest	By Expense
10%	1.8%	.3%	1.5%
20%	2.1%	.6%	1.5%
30%	2.4%	.9%	1.5%

(c) 5 per cent of fixed capital growth annually

Reserve	Total Accrual	By Interest	By Expense
10%	2.0%	.3%	1.7%
20%	2.5%	.6%	1.9%
30%	3.0%	.9%	2.1%

(d) 7½ per cent of fixed capital growth annually

Reserve	Total Accrual	By Interest	By Expense
10%	2.25%	.3%	1.95%
20%	3.0 %	.6%	2.4 %
30%	3.75%	.9%	2.85%

It will be seen from the examples that the variation, both in total accruals and in the charges to expense, are far less than are the differences of opinion as to a proper estimate to use for service lives. The results are, however, readily susceptible to checking by the staffs of the regulatory bodies by the use of judgment and life tables for the purpose of establishing a suitable ceiling against charges to expense which will in any way raise rates to the public.

Different rates of growth (2-7½ per cent) make far greater differences than do variations in reserve size even when as great as from 10 to 30 per cent.

The conclusions from these figures are that, as far as effect on rates is concerned, the choice of the objective size of reserve is relatively immaterial and that conditions other than estimated lives (such as size, character of property and exposure to hazards) should be accorded the greater weight in the selection of objective reserve size. The adoption of a 20 per cent figure would probably be satisfactory in 80 per cent of all cases although special conditions might call for a larger or smaller objective.

Chart 4 indicates in perhaps the simplest possible manner what little difference in the expense item is caused by the size of the reserve.

In this chart is depicted (from the data of The Hartford Electric Light Company) during a period of rapid percentage growth (i.e. from 1915 to 1930), and during a period of slower percentage growth (i.e. from 1927 to 1942):

1. The "critical" point for total accretions to the reserve as calculated from year to year on the basis of the preceding 15 years; and

2. The amount of such accruals to be charged to expense when interest on the reserve is figured at 3%.

These figures are plotted for reserves of 15, 20 and 25 per cent.

It is interesting to note that, even in the period of most rapid growth and where the effect of size of reserve is the greatest, the variation in the total reserve accrual in the three cases was only from 2.40 to 3.31 per cent of fixed capital and the variation in the expense component only from 1.95 to 2.55 per cent.

These variations constantly diminished as growth became less rapid and as of 1942 have stabilized with a spread of total accruals falling between the limits of 1.68 and 2.12; and the spread in the expense item has practically disappeared.

It is obvious, therefore, that the choice in reserve size has a negligible effect on rates once the reserve has been created; and the choice of size becomes a matter of judgment as to the elimination of the hazard of financial embarrassment.

The days of rapid percentage growth are passed now that the industry has approached the stabilized condition of practically universal service. No longer do our New Business Departments have available the past existing unserved suburban and rural territories or the great volume of unwired buildings and the preponderance of isolated plants; for the future they must depend on the increasing usefulness of our service to existing customers to be brought about by better and lower cost apparatus and by constantly lowered cost of service.

VI—DEPRECIATION RESERVE —WHAT IS IT?

The report of the NARUC Depreciation Committee submitted to the 1943 convention states that the reserve is not a fund but a contra to the plant (fixed capital) account. This forced definition is essential to the illogical use of the reserve recommended in the same report. But a change of name cannot change the inherent character of the object so described. Webster's dictionary defines reserve as:

"That portion of the earnings of a corporation set aside to meet future losses or contingent liabilities."

The rates charged to the customer are only permitted to be as high as they are in practice in order that the revenue derived therefrom shall be sufficiently large to include a contribution toward the recoupment of the cost of the facilities which are, or will be, consumed in his service. This contribution is received in the form of cash and, except as it may be temporarily invested, remains as cash, under restrictions of the regulatory body preventing any reduction in the liability, until applied to its intended purpose of the recoupment of cost.

The claim of the service life advocates is that the sum collected is used for its intended purpose immediately upon receipt as representing recoupment of cost of the currently reduced service life of the facilities. This concept the Supreme Court has again and again properly rejected since only a small portion of depreciation (in its economic sense) is progressively a function of time and can be assumed to take place currently. At the utmost it is only this small part for which it might be assumed there was a recoupment or a substitution of capital.

For the balance (which is a provision

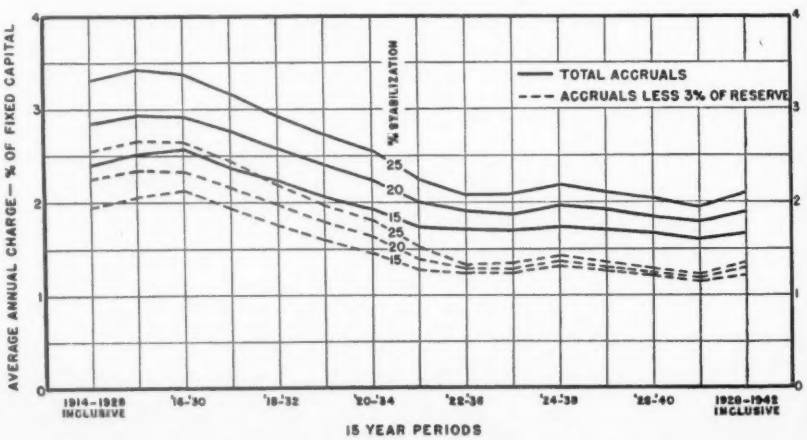

Chart 4

against depreciation which has not yet taken place) there is no alternative but to consider it as the assets of a reserve which, having been collected for a specific purpose, must be preserved for that purpose. To consider it as a *contra* to the useful property is nothing but to consider the customer as purchasing such useful property on a rental-purchase plan, where the payments go into a non-distributable account from which the original investor receives no reimbursement. Since the customer does not take title it becomes, as applied to the balance sheet, a "write-down" based on arbitrary life estimates fully as indefensible as were past "write-ups" based on arbitrary estimates of value.

When the reserve is viewed as having the attributes of a trust, it must be clearly borne in mind that the beneficiary is neither the investor nor the customer but is the property owned by the company and dedicated to the service of the public.

VII—THE RETIREMENT RESERVE METHOD

For a number of years prior to the adoption in 1935 by the Federal Power Commission of its present system of accounts, the so-called "retirement reserve method" was largely used in utility accounting. It was the abuse of the method rather than any inherent fundamental error which brought it into discredit and has caused regulatory bodies to use such great efforts in an endeavor to make the "service life theory" into an acceptable substitute.

In the system of accounts prescribed prior to 1935 the instructions as to accruals to the depreciation reserve read as follows:

"*782—Retirement Expense.*

This account shall include such amounts, in addition to appropriations from surplus to retirement reserve, as the accounting company may determine to be necessary to provide a reserve against which may be charged the original cost of all property retired from service plus the cost of dismantling, less salvage. The amounts charged to this account, or appropriated from surplus, and credited to the "Retirement Reserve" shall be in addition to the necessary costs of keeping the plant and equipment in a high state of efficiency through charges to the regular maintenance accounts.

Note.—It is the intent of the classification that a reserve shall be provided, either through retirement expense or by appropriations from surplus or both, sufficient to cover all retirement losses that may reasonably be expected.

"*502—Appropriations to Reserves.*

This account shall include appropriations from surplus for sinking fund and other reserves and allotments of surplus or payment of definite amounts from surplus into sinking fund and other reserves under the terms of mortgages, deeds of trust, or other contracts; and such other appropriations of surplus to be set aside in special reserve accounts as the accounting company may make.

Note.—It is the intent of the classification that a reserve shall be provided either through retirement expense, appropriations from surplus, or both, sufficient to cover all retirement losses that may reasonably be expected.

This method of accounting had weaknesses of so serious a nature as to overbalance the predominantly sound feature on which it was based. Consequently it was fortunate that the influence of the Federal Power Commission caused the curtailment of its abuses before material injury was done to the industry. The three major faults were:

1. No direct or indirect recognition was accorded to such plant depreciation as in fact had at any time taken place or was taking place coincident with the passage of time.

2. No minimum and maximum limits were set up as defining the range within which judgment might guide the selection of a commission-approved reserve size appropriate to the extent, nature and diversity of the fixed capital of a company.

3. There was no requirement that there must be strict adherence, regardless of earnings or other considerations, to such formula covering annual accretions to the reserve as had received Commission approval.

These three points of weakness left the door wide open to such financial abuses as would have caused the weakening of the capital structure of subsidiary companies through pressure for the payment of dividends to top companies. While such abuses were not general in the industry, there were enough specific instances to cause the method to fall into disrepute.

On the other hand, the principle of preparing to meet present and future liabilities of unknown amounts, of unknown incidence and unknown diversities through the creation of a reserve of appropriate size is fundamentally sound both from operating and accounting points of view.

It is this "proper reserve" principle in combination with the sound element in the "service life" method (i.e., a recognition of a reasonably conservative approximation of the amount of depreciation which has in fact taken place) which this book advocates, rather than the total rejection of either method as a solution to the problem of depreciation accounting.

The improper use of the retirement method could not have been continued if the industry was to be sound financially, although during the period of rapid changes in the art and great expansion of business the deleterious effects were not so pronounced as might have been expected. The change to the service life method in 1935 in conformance with the Federal Power Commission's System of Accounts made no effort at correction of past faults but substituted an entirely new concept. This concept, after eight years of experience, has been found to be unsatisfactory in that it violates in one respect or another certain fundamentals of fact, equity and logic.

The necessities of the case require a careful and unprejudiced review of the elements of both methods—seeking to retain the good and reject the bad features of each; always having in mind the objective sought rather than the details of method leading to that objective.

Any combination of the two methods, in order to be satisfactory from both operating and accounting points of view, would seem to require:

1. That recognition must be accorded to the fact that at any particular time there exists a certain amount of depreciation which has in fact taken place.

2. That a reserve to be classed as adequate must be sufficiently large to make preparation to meet future liability for depreciation which has not as yet taken place; as well as to cover such amounts of depreciation as have in fact already taken place.

3. That the annual accruals required by the adopted formula shall be made in each and every year regardless of effect on the earnings statement of the year.

VIII—TREATMENT OF DEPRECIATION RESERVE

The utility company has been permitted to collect this reserve in its charges for one specific purpose and only one, namely—to protect the integrity and efficiency of the property in the interest of both the customer[15] (as to continuity and quality of service) and the investor (as to the safety of his investment).

Having been collected for this purpose, there is attached to the reserve an attribute of trust that the objective shall be attained, and the reserve liability should, therefore, be religiously observed even though the assets of the reserve belong in fact and in law[16] to the company.

The beneficiary of the reserve is neither the customer nor the investor but is the *property* owned by the company and dedicated to the service of the public. In consequence, the regulatory authorities either by their own accounting orders or as specifically directed by

[15] Lindheimer vs. Ill. Bell Tel. Co. 292 U. S. 151: "In determining reasonable rates for supplying public service, it is proper to include in the operating expenses, that is, in the cost of producing the service, an allowance for consumption of capital in order to maintain the integrity of the investment in the service rendered."

[16] Bd. Commissioners vs. N. Y. Telephone Co. 271 U. S. 23.

law[17] do not permit the permanent diversion of the reserve to other corporate uses or to disbursement to investors.

Inasmuch as it is only by the permission of the regulatory body that a preparation against future depreciation may be treated as a present expense and collected from the consumer prior to the occurrence of depreciation, it is equitable that, as a condition of such collection, the regulatory body shall insist on the recognition of an appropriate customer equity in any earnings to be derived from the temporary use of these funds thus collected in advance.

Of course if the company, as custodian of the funds, held them in cash awaiting their application to the intended purpose, the objective which justified their collection would be accomplished and the obligations of the reserve fulfilled; but that would be an economic waste which can be prevented by their temporary investment in securities or property with the sanction of the regulatory body.

An appropriate and wholly legal extension of the rules of the regulatory authorities would be an order that any temporary investment in either securities or property may be made by the custodian only with their specific permission and under conditions to be specified.

If the request was to invest in securities it would be appropriate for the regulatory body to specify the nature of same, having in mind the necessary degree of safety and liquidity, as is done by the Bank Commissioner in case of trust investments. Also, in case of such investment, all net earnings, after taxes, derived from such securities could properly be required to be added to the principal of the reserve (and thus reduce the otherwise necessary charges to expense and rates) since no action, effort or responsibility on the part of the investors is required for the production of these earnings.

If the request was for permission to invest temporarily in the property, the Commission might properly designate the rate of interest to be paid thereon out of the permitted return on an undepreciated rate base. In this case action, effort and responsibility on the part of the investors are required to make earnings from this source possible since except for their agreement to return these funds on demand when needed for their intended purpose they would be tied up in bricks and mortar and totally unavailable. Such essential action on the investors' part makes equitable some share of the earnings which they thus make possible from the temporary investment in property of the customers' advance payments.

It is consequently desirable that the regulatory body make such rules and regulations as will permit the use of these funds temporarily for other corporate purposes but only on the condition that, by appropriate interest credits to the reserve, there shall be an equitable division of the earnings thus derived from such sums as the company has been permitted to collect for a specific purpose in advance of the necessities of that purpose.

The regulatory body, in fixing the rate of interest to be credited to the reserve out of permitted earnings on such amounts as are invested in the property, should give appropriate weight to:

1—Earnings which would otherwise be obtained from investment in trust fund securities.

2—Earnings which will be obtained from investment in property.

3—The cost of the otherwise necessary money if the reserves were not to be used temporarily for such corporate purposes.

Unless the case should be exceptional (in which event it should be treated on its merits) it is believed that the alternative cost of money would usually also satisfy the equities as between consumer and investor.

IX—THE DEPRECIATION PROBLEM IN REGULATION

The treatment of depreciation in an industry where earnings are limited by the Courts to a specified return on value is of far greater importance and of a very different significance than in the case of the ordinary competitive manufacturing industry. In the latter case all that is required is that such reasonable amount of unrestricted earnings of the company shall be held back from distribution as will amortize the cost of the property as quickly as competitive conditions in the industry may dictate. The earnings or earning ability would not be affected in the slightest if there were to be no such account on the books, provided the same amounts were in fact held back from distribution and the corresponding increase in the surplus account was the only entry to be made. Such, of course, would not be good accounting and the balance sheet would not be a truthful statement as to the assets and liabilities of the company; but so far as ability to compete or to earn, it would make no difference.

In the case of a utility the situation is very different as the earnings permitted are predicated on "value" in the determination of which loss or depreciation which has in fact taken place is a factor.

A discussion of depreciation does not need to involve a discussion of whether "value" be defined as original cost, reproduction cost, historical cost or in any other manner. All it is concerned with is the accomplishment of and accounting for the *recoupment of costs;* and always it must be kept in mind that "value" is factual and not affected in any way by the time when—or method by which—the payments to cover loss of value, when it occurs, are made by the customer in whose service the facilities are consumed.

The improvement in fixed capital accounting, prescribed by the Federal Power Commission, greatly facilitates a clearer view of the situation than has existed in the past in that this account (now called plant) is subdivided into:

(a) Original cost
(b) Acquisition cost

Both subdivisions must receive appropriate consideration in the determination of a rate base but only original cost (modified by such elements of acquisition cost as are identifiable with the property) need to be considered in depreciation accounting. The balance of acquisition cost may be left as a fixed item on the books and in the rate base; or it may be appropriately amortized in accordance with the equities of the situation, since it is in effect the cost of the business purchased even though entered on the books as cost of physical property. Property cost, on the other hand, may disappear only with the withdrawal of the property it represents; and under present utility law and court decisions may never be amortized[18] by means of charges made to the public.

The "service life" method of accounting assumes the propriety of amortizing original cost over some assumed life period by means of payments collected from the customer (on the ground of return *of* capital) but conceals this assumption under the camouflage of depreciation.

The industry resistance to this assumption (wherein it has invariably

[17] District of Columbia Public Utility Act, Section 16.

[18] See further Mr. Justice Butler's concurring opinion in Lindheimer vs. Ill. Bell Tel. Co. 292 U. S. 181.

been supported by the Courts) is what has caused the principal delays in the final adjudication of rate cases and is responsible for the mass of unreliable expert testimony and fictitious life table estimates which have unduly prolonged the proceedings in such cases. If this particular cause for dispute can be eliminated and the undepreciated first cost can be used with equity for its evidentiary value in the rate base determination, there is then no ground for appeal to the Federal Courts on the claim of confiscation,[19] since there has been no deduction, proper or improper, for depreciation in the determination of value.

The elimination of this ground for appeal in no way hampers the Commission in its determination of what rates are proper because it ("within the ambit of its statutory authority[20]") is the final arbiter as to what constitutes a fair return; and can just as well decree that 5 per cent on an undepreciated rate base constitutes a fair return as it can define 6 per cent as fair on a rate base wherein the evidentiary value of original cost has been reduced by 17 per cent on the assumption that such is the so-called "reserve requirement" or because such an amount has been paid in by the customers as a return of capital. The results are the same but the difference is that 5 per cent on the undepreciated cost cannot be appealed to the Federal Courts while a larger rate on a depreciated base can—on the ground of confiscation by reason of erroneous assumptions as to value.

Furthermore as public opinion is, in the last analysis, the ultimate controlling factor it is far better both for the commission and the company to make so plain their difference of opinion, if any, that the man on the street will understand the point of the controversy. This he will do if it is stated in plain terms that the argument is as to whether 5, 6 or 7 per cent constitutes a fair return on the value of the property, which in fact he is using daily. On the other hand, he will have no understanding relative to service lives, the methods for their determination and the theoretical amounts which should be deducted from the cost of the actual property in daily use.

The argument of "no appeal to Federal Courts" does not of course apply if a Commission should go beyond the ambit of its authority and decree a rate so low as in itself to be confiscatory. This situation is, however, unlikely to exist, as the fair-mindedness of the American public would resent such an effort, even though ostensibly in their interest, with respect to resulting rates.

The other controvery which can be totally eliminated by the plan proposed in Section II is as to how much shall be permitted as an annual accrual to the reserve and its corresponding charge to expense. The industry is commonly charged with inconsistency in this respect as claiming a larger annual charge for depreciation than it will admit in the balance sheet to have in fact taken place. Those who make this charge forget that the item in the operating expenses is provision for depreciation—present, past and future—while all that can be conceded as representing factual depreciation on the balance sheet is such partial deterioration (including obsolescence) as in fact exists in facilities which are still in use.

When, as explained in Section IV the amount of the annual accrual is arithmetically determined from the past accounting records of the company in conjunction with a reserve of the objective size as previously selected by the company, the question is no longer open to controversy in a rate case and this factor of regulation becomes, as desired by regulatory authorities, a simple computation from the accounting records of the company without any of the uncertainties attendant upon the effort to determine service lives with a reasonable degree of probability.

Since all charges to expense must be appropriately covered by revenues, it is essential to the establishment of fair and reasonable rates that the amounts charged to expense for depreciation shall not be either unreasonably small or unreasonably large.

The Regulatory Commission interest that it be not too small rests primarily on its responsibility that proper provision shall be made to insure adequate and economical service to the public; the company looks to the protection of its investors by ample asset coverage. The proposed method, whereby a stipulated reserve is automatically maintained, insures the adequacy of the protection of both parties without further checks as to minimum accruals.

Both the Regulatory Commission and the company are, or should be, interested that the charges to expense are not too large; the Commission because of its duty to keep rates down in the interest of consumers and the company because intelligent self interest will dictate low rates as a stimulant to growth. In consequence, the results attained by the proposed method may very properly be checked against the possibility of excessive charges to expense by the staff of the Regulatory Commission by means of conservative life tables combined with their judgment and experience. Such a check would provide a very proper ceiling for the protection of the public even though not capable of determining the actual depreciation taking place in the accounting period.

X—DEPRECIATION PROBLEM IN REORGANIZATION

As pointed out in Section IX the determination of a regulatory commission as to a proper rate level need not be affected, whether a depreciated or undepreciated first cost is used, when considering the evidentiary weight of first cost in a rate base determination. On the other hand, the permitted capitalization of a company may be greatly affected to the harm or benefit of those who furnished the funds to provide the utility service for the public. This has been in evidence in some of the reorganization cases before the SEC[21] where, naturally, present value is the basis for the face value of the new securities to be issued.

If the regulatory body has accepted the "service life" theory, as a basis for its operations, it must of necessity deduct the so-called "reserve requirement" or the reserve, if higher, in finding value. Inasmuch as this "reserve requirement" determined from historical life tables covering the period of infancy and youth of the industry is far in excess of the depreciation which in fact has taken place in a company able to give good service, the result is arbitrarily to reduce "value" and the consequent face value of securities to be issued in exchange for the old financing.

If in the past, securities have been issued improperly, they can be disallowed without resorting to depreciation as an excuse. Or, if acquisition cost which was the basis of some old financing is no longer to be recognized as a legal backing for new issues, the question should be decided quite independently of the depreciation problem; and value, how-

(*Continued on page* 126)

[19] Rate cases go to the Federal Courts usually on constitutional grounds under amendments V and XIV that the utility is being deprived of property without due process of law or without just compensation.

[20] Federal Power Commission vs. Natural Gas Pipeline Co. 315 U. S. 586.

[21] Securities and Exchange Commission.

Future Trends in Cables for Distribution Voltages

By G. B. Shanklin

General Electric Company, Schenectady, N. Y.

Presented before the Transmission and Distribution Committee, EEI, Cincinnati, Ohio, Feb. 15

ANY estimate of future trends in primary and secondary distribution cable practice after the war, when we are again on a normal peace-time basis, must have some elements of speculation.

The development of distribution cable was progressing in a normal and steady way when the war started. Some of these activities were put aside for the duration and will be taken up again as soon as conditions justify it. Other developments were accelerated and broadened to more exactly meet urgent war requirements.

The bulk of the enormous amount of cable produced during the war has been for purposes closely paralleling distribution cable requirements. There is, accordingly, no speculation at all in predicting that post-war distribution cable will benefit directly from these war-time accomplishments. Difficulty is encountered only in attempting, at this early date, to be specific about these benefits. The path will be charted by the old law of "the survival of the fittest," and this will largely be determined by the availability of post-war sources of supply and the relative cost of raw materials. At the present time no one could be specific in prophesying the outcome in these respects.

In meeting the enormous demand for insulated cable during the war a primary factor has, of course, been conservation of critical materials and the use of more readily available substitutes wherever possible. Developments that would ordinarily require years have been crowded through in a short time. Expediency has brought out many new materials and new ways of doing things. Cost has been of secondary consideration. The best of all this will survive and be improved after the war and the rest will be written off against experience and knowledge.

Some of the more promising developments and trends that should have direct bearing on post-war distribution cable will be briefly discussed.

Rubber Insulated Cable

The development of rubber insulated cable will be taken up where it was left off during the war. The scarcity of crude rubber and almost complete stoppage of rubber cable production a few months ago by Government order has held up progress in this direction and turned all activities towards the development and production of synthetic substitutes. Just how much of this lost ground will be recovered after the war, it is impossible to predict at present, since future availability and cost of crude rubber will be determining factors. Certainly, the tried and proved rubber insulated cable, the characteristics of which are well known, will continue to be the yardstick with which the merits of the synthetic insulated cables will be measured and their survival determined.

The only safe assumption to make is that to some extent at least, and possibly to a very considerable extent, the use of rubber insulated cables will continue after the war. The synthetics, themselves, can contribute to this by providing protective coverings that better resist exposure to sunlight, ozone, oil and other agents that affect the durability of rubber. Compounding of natural rubber and synthetics is another field that will receive active attention when the war is over and crude rubber is once more available. In the meantime we can well center our attention on the synthetics.

Synthetic Insulating Cable

Only those synthetics that show present promise of interest or usefulness in distribution cable design will be discussed. Systematic research studies are being carried out, however, on all flexible synthetics to make sure that no possibility is overlooked, and that we will be ready to meet any situation that arises after the war. Those desiring more information about this, and the basic chemical theories involved, are referred to Dr. A. M. Ross' article, "Synthetic Flexible Insulations," General Electric Review, April, 1943.

Table I lists those synthetics that will be briefly dealt with in the present paper. Pertinent characteristics are also listed and evaluated. Details of the chemical structure and additional information can be obtained from Dr. Ross' article.

Buna-S

At present this synthetic is of greatest interest chiefly because it was chosen by the Government to replace natural rubber in automobile tires and large capacity plants were put in production for this purpose. Part of this production was and is earmarked for the cable industry and for several months past Buna-S has replaced natural rubber in the bulk of the cable produced. It does not process as readily as natural rubber and, so far, the basic cost appears to have been higher. Both processing and cost will improve with time. The former can be disregarded as a post-war factor. The latter is highly speculative and will depend upon economic conditions after the war that cannot now be predicted. At this early stage, it does appear that Buna-S is of inherently higher cost than natural rubber.

The production of crude Buna-S has, so far, been governed by tire requirements. There has, accordingly, been great difficulty in obtaining uniform electrical properties in finished cable, the different batches of crude Buna-S varying in this respect. No doubt this will be corrected by more rigid specifications and the setting aside of one or more rubber plants to meet this special demand. Steps have already been taken with this end in view.

Disregarding these difficulties, it can be said that the changeover to Buna-S in place of natural rubber in power cable has successfully met wartime emergency conditions and has given us a good working knowledge of the relative electrical and physical characteristics of these two types of cable. Buna-S is a pure hydro-carbon with much the same chemical structure as natural rubber. It is not surprising, then, to find that you can do about the same things with Buna-S as you can with rubber, and the all-around electrical and physical characteristics of finished cables are closely comparable.

Buna-S and rubber offer the same advantages and disadvantages in cable design. Both have good moisture resis-

TABLE I—RUBBER AND RUBBER-LIKE MATERIALS FOR CABLE CONSTRUCTION

Compound	Natural Rubber	Buna-S	Butyl	Polyvinyl Chloride	Chloroprene	Polysulphides	Buna-N
Commercial or Trade Name	--	GR-S	GR-I	Flamenol	Neoprene	Thiokol	Perbunan
Type	Thermo-setting	Thermo-setting	Thermo-setting	Thermo-plastic	Thermo-setting	Thermo-plastic	Thermo-setting
Use	Ins. or Jacket	Ins. or Jacket	Ins. Chiefly	Ins.or Jacket	Jacket only	Jacket only	Jacket only
Dielectric Prop.	G	G	E	F	P	P	P
Mechanical Prop.	E	G	F	G	G	F	G
Heat Flow	E	G	G	P	E	P	E
Heat Resist.	F	G	G	F	G	P	G
Flame Resist.	P	P	P	E	E	P	P
Ozone	P	P	E	E	G	E	P
Sunlight	F	F	G	E	G	G	F
Oil	P	F	P	E	G	E	G
Moisture	G	G	E	G	E	G	F
Brittle Point	E	G	G	F	G	G	G

E - Excellent, G - Good, F - Fair, P - Poor

tance and good mechanical and electrical properties, with rubber now a bit ahead in the latter two respects. On the other hand, Buna-S appears to resist heat and oxidation a bit better. They are about equally susceptible to corona cutting and sunlight and both are inflammable. Buna-S resists oil better but both must be protected from such exposure.

Plainly, competition between these two materials after the war is going to be based chiefly on availability and cost.

Butyl

This synthetic is not yet in quantity production and only limited amounts of the crude material have been available for experimental purposes. From a cable standpoint, it appears to be one of the most promising of the rubber-like insulations, with a better chance than other synthetics of cost equality with natural rubber after the war. It has, so far, seemed to show better electrical properties than natural rubber and better resistance against heat, oxidation, corona cutting, sunlight and moisture. In oil and flame resistance the two materials are equally susceptible. Mechanically, Butyl is inferior to rubber, although this might be sufficiently improved in the future to allow its use as a jacket. For the present, it appears most promising as a base insulation.

Inherently, Butyl appears to be attractive from a cost standpoint. Nothing more can be said about it until quantity production experience is obtained and post-war sources of supply are worked out more fully. It would not be surprising to see Butyl play a more useful part than Buna-S in the future cable industry.

Flamenol

Polyvinyl chloride (Flamenol) is one of the older synthetics in general use as a wire and cable insulation before the war. Its high resistance to most chemicals, oxidation, sunlight, ozone, moisture and flame, and its tough physical properties have, from the beginning, made it a very satisfactory control, signal, and all-purpose wire insulation, without the need of protective finishes. It has also served as a durable fire and oil resistant jacket for varnished cambric and rubber insulated power cable.

During the war the improvement and use of Flamenol has grown rapidly and it has proved of great help in rubber conservation. Its dielectric strength has always been high but relatively high dielectric losses have until recently limited it to 600 volts, except for such service as series street lighting, where Flamenol insulated cable has been used successfully up to 5 kv. The dielectric losses have now been materially improved and the useful operating voltage range can be extended. Low temperature flexing is another property that has been improved recently and can no longer be considered a practical handicap under normal conditions of use.

Flamenol, however, is a thermoplastic with limitations of conductor size and operating temperature to avoid displacement. Cost of the crude material is another consideration that will limit its future use to all-purpose insulated wire, the smaller cable sizes and as a protective jacket for the larger cables. Few of the synthetics are flame resistant. This property of Flamenol and its high resistance to oil and other harmful agents will reserve it a useful place in the post-war cable industry.

Polyethylene

Polyethylene has the lowest losses and best electrical characteristics of those synthetics that show promise as cable insulations. It was especially developed and is being used for high frequency cables. Its high resistance to corona and sunlight and its good resistance to oil and moisture may broaden its application to the high voltage power cable field, but this can be better determined after more complete development and trial. Polyethylene is a thermoplastic with limitations of conductor size and operating temperature. Its present cost is relatively high but quantity production after the war could reduce this. Its unusual electrical properties do, however, warrant a careful study of its possibilities. Other than this, no reliable predictions can be made about its future.

Neoprene

Neoprene is the only thermo-setting rubber-like synthetic with high flame resistance. Its poor electrical characteristics and relatively high cost will probably continue to limit its use chiefly to protective jackets, where it has served and will continue to serve a useful purpose because of its good resistance to flame, aging, sunlight, ozone and oil.

Thiokol

Poor electrical characteristics have always limited Thiokol to use as a protective jacket. Both Flamenol and Neoprene have some advantages in this respect and the future use of Thiokol would appear to depend upon post-war economic conditions more than anything else.

Buna-N

Buna-N is now becoming available for cable use and enough is known of it to give the evaluation shown in Table I. Its poor electrical properties will limit it to jacket use. Excellent mechanical properties and resistance to oil give it some promise as a sheath for portable cable rather than underground distribution cable. More than this cannot be said until its post-war availability and cost are better charted.

Summary

The foregoing comments lead to a reasonable prediction that future distribution cable with rubber or rubber-like insulation will be of improved durability and quality. The main insulation will consist of natural rubber or synthetic rubber as dependent upon post-war availability and cost of raw materials. Protective coverings will be required, as in the past, either metallic or nonmetallic. There will be no radical changes in operating voltage or temperature limits, possibly some increases but nothing radical. Improved durability may extend the use of nonmetallic underground distribution cable, particularly low voltage network cable, but lead sheaths for such cable will by no means be dispensed with.

Varnished Cambric Insulated Cable

The high temperature asphaltic base varnished cambric developed before the war allowed an increase of about 10 C in the maximum copper temperature of V.C. insulated cable. The imported raw materials used in this varnish became increasingly difficult to obtain under war conditions, necessitating almost overnight changes in methods and materials. Development activities were centered on keeping up the quality of V.C. cable with those materials available. That we succeeded in doing this speaks well for the future quality of this type of cable.

No radical changes are expected in V.C. insulated distribution cable after the war. Black, asphaltic base varnished cloth should continue to be used, and with the things learned through necessity the quality will improve, regardless of future availability of raw materials.

A great deal of progress has been made with synthetic varnishes and they are proving of increasing value for special uses. All of the synthetic varnished cloths are, however, of higher cost and are not likely to replace asphaltic base varnished cambric as an insulation in standard cable for some time to come.

Synthetic jacketed V.C. cable has been produced in large quantities during the war for special uses. This jacket has good flame, moisture and oil resistance but its replacement of the old rubber hose jacket in future distribution work faces the same unpredictable economic conditions previously outlined. In general, synthetic jackets are proving of higher cost than rubber hose jacket.

Aerial Cable

Conditions midway between those allowing open wire overhead distribution and underground distribution are best met by aerial cable. Neater appearance, limited space, absence of tree trimming, continuity of service, and safety frequently justify aerial cable in place of open wire construction.

The use of rubber or V.C. insulated, self-supporting aerial cable in such cases should expand in the future, for several years' experience has shown advantages of cost, simplicity and installation time over the usual separate messenger wire support, except in the larger, heavier cable sizes. Two self-supporting designs have been developed. One consists of a special, self-supporting wire armor overall (Type SS). The other consists of a copperweld messenger wire, preassembled as part of the cable construction in the factory.

Paper-Insulated Cable

In the future, paper insulated cable should hold its place in the distribution field. At the higher primary voltages, 15 to 35 kv, it should continue to be first choice and, in fact, probably be the only economic choice at 23 kv and above.

The following comments apply chiefly to the higher primary voltages.

Solid Type Cable

The solid type paper insulated cable has been so fully developed over a long period of years that no marked changes in design are indicated. Improvement in quality has greatly reduced inherent insulation failures in recent years. If the present trend toward further reduction in insulation thicknesses is carried too far this trouble will come back into the picture again. In the meantime, operating records show that the great majority of service failures are due to lead sheath damage. Sheath fatigue due to load cycle cable movement and cumulative internal pressures built up by heavy loading and compound migration are the real problems in this respect. The future trend will aim towards correction of these troubles. Close attention is already being given to this by the operators and manufacturers. In time, the factors and limits involved will be better understood and under better control.

Gas Filled Cable

Gas filled cable is now a fully proved and standard product and a trend toward its increased use for primary distribution feeders is plainly indicated, especially those high voltage primary feeders where continuity of service is important. Sheath stresses, self-supervision of sheath, uniformity, ionization and exclusion of outside impurities, such as moisture and air, are all under control and give better assurance of performance.

During the past five years more than a quarter million feet of gas-filled cable has been installed at voltage ratings from 15 kv to 45 kv. No service failures have occurred and troubles have been limited to minor cases of gas leakage and some cases of sheath fatigue from severe cable movement. In the latter respect, gas filled cable is no different from other types of lead sheath cable. Adequate space in ducts and manholes for taking care of cable movement is still necessary. Gas filled cable does, however, give prompt notification of such sheath leaks, which can be corrected before service failures develop.

Bibliography and Abstracts on Electrical Contacts

The American Society for Testing Materials has recently published a useful reference work on the subject of electrical contacts resulting from the work of Committee B-4 of that society. The volume consists of a bibliography, with abstracts, on many aspects of the problems involved in electrical contacts. Some idea of the subjects covered can be had from the following partial list:

Electrical Contacts—General
Contact Materials
Circuit Breaker Design and Testing
Relays
Stationary Contacts
Sliding Contacts
Miscellaneous Contact Applications
Contact Resistance and Temperature
Electric Arc as Applied to Contacts
Electric Arc in General
Spark Discharge
Glow Discharge
Low Voltage Arc
Contact Wear
Circuit and Circuit Parameters as Applied to Contact Operation

The abstracts are quite complete and informative. The book may be ordered from the American Society for Testing Materials, 260 South Broad Street, Philadelphia, Pennsylvania, as "Bibliography on Electrical Contacts"; the price is $4.00 per copy to ASTM members and $5.00 to others.

Progress Report No. 2

Fundamental Investigation of Graphitization of Piping

CONDUCTED BY JOINT EEI-AEIC SUBCOMMITTEE ON GRAPHITIZATION OF PIPING
ALEX D. BAILEY, *Chairman* SABIN CROCKER, *Secretary*

March 1, 1944

PROGRESS Report No. 1 dated August 26, 1943, which was distributed in mimeograph form to those directly interested and published in the EEI BULLETIN for October, 1943, covered a preliminary survey of graphitization of piping. The findings reported at that time demonstrated the need for a fundamental investigation of the conditions which may produce graphitization of piping materials. A detailed outline of the program to be carried out at Battelle Memorial Institute, dated August 28, 1943, was mailed to those concerned and published in connection with Progress Report No. 1 in the EEI BULLETIN for October, 1943.

The following ten questions forming the basis for that program are reproduced here as helpful in understanding the aims of the fundamental study:

1. What is the specific cause of graphitization, particularly in the form encountered at Springdale? Among other possibilities to be considered are the effect of: (a) upsetting, with and without subsequent heat-treatment; (b) grease applied to the pipe ends during fabrication as a possible source of carburizing; (c) the deoxidizing practice in steel manufacture; (d) beneficial or adverse effects of alloying elements present in the steel; (e) thermal gradients produced in welding and stress relieving.

2. Why were the header and the valve side of the Springdale joints immune from graphitization?

3. How susceptible (or immune) is the A206 silicon-killed (low-aluminum) variety of carbon-moly to graphitization?

4. How serious are the varying degrees of graphitization so far observed and how fast does it progress from one stage to another?

5. What can be done to restore graphite to solution in joints which now exhibit some slight deterioration?

6. What steels should be specified in the future to avoid graphitization?

7. Is torch beveling of pipe ends preparatory to welding conducive to graphitization?

8. What procedure should be followed in repairing defective joints such as those found at Springdale and how should they be preheated and stress-relieved or otherwise heat-treated? (In this connection it is suggested for one thing that the optimum degree of preheat be determined and the need for continuing preheat and the welding operation continuously from start to finish of any one joint.)

9. What, if any, is the effect of vibration or stress, and of temperature cycles from the cold to hot condition and back again?

10. Is cold working such as would be produced by too coarse a tool feed in the machine beveling of pipe ends conducive to graphitization?

Three furnaces are now in operation at Battelle on long-time tests of the rate of graphitization of welded and unwelded carbon-moly specimens. Samples of both new and used carbon steel and carbon-moly pipe have been obtained from a pipe manufacturer and from various central stations. Temperatures selected for testing graphitization rates of carbon-moly steel are 925, 1025 and 1125 F. This top temperature of 1125 F. is considered to be about as high as can be used to advantage in view of the re-solution of graphite which has been shown to occur in heating at temperatures approaching 1300 F. Some tests will be made on plain carbon steel but principal emphasis will be placed on tests of carbon-moly pipe.

Electron diffraction patterns from different areas of a specimen fractured through the "eyebrows" appear to give a positive identification of the actual presence of graphite. This finding is important because of skepticism in some quarters as to whether the constituent termed "graphite" really existed in the affected joints. Electrolytic and chemical extraction methods of recovering graphite have not proved completely satisfactory because of interference of carbides.

McQuaid-Ehn tests have been made on fourteen selected specimens. This test classifies steels according to grain size and normality of the pearlite of the carburized case which is obtained by heating samples packed in a carburizing compound for eight hours at 1700 F. If the pearlite grains in the carburized case are surrounded by continuous envelopes of cementite, the steel is considered to be "normal"; if the envelopes are discontinuous the steel is classed as "abnormal." This test is expected to give better information on the deoxidation practice used in making the steel than is given by records of the amount of aluminum added per ton. It has not been possible to correlate results of McQuaid-Ehn tests with graphitization to any extent as yet, but no case of graphitization of a fully "normal" steel has been reported.

The extent of graphitization disclosed by individual investigations of cooperating companies may be gauged to some extent by the following summary covering 38 different piping systems as reported for 33 stations:

SUMMARY OF PIPING SYSTEMS EXAMINED

	Degree of Graphitization			
	None	*Severe*	*Moderate*	*Slight*
*High aluminum carbon-moly 10	4	5	1	
Low aluminum carbon-moly 11	0	1	0	
Carbon steel 3	1	2	0	
Total all materials 24	5**	8	1	

The above classifications are somewhat arbitrary and there are legitimate differences of opinion as to the degree found in particular samples. The "severe" classification is intended to cover the continuous grain boundary segregation type of graphitization which gave

* Carbon-moly pipe made prior to 1939 to ASTM Spec. A158 and to A-206-37T and 38T was of the high-aluminum variety, i.e., had 1.5 lb. or more of aluminum added per ton after deoxidizing with silicon. The low-aluminum variety has approximately 0.5 lb. of aluminum added per ton.

** Two of these are border-line cases between "severe" and "moderate" and ultimately may be classed as "moderate."

the brittle condition found in some joints at Springdale. The "moderate" classification refers to nodules of graphite formed more or less completely within the carbide areas. The "slight" degree of graphitization refers to a random distribution of small graphite nodules. It is not now known whether there is a definite tendency for the lesser degrees of graphitization to progress to the more severe types.

From a survey of results so far reported it would appear probable that there is no single answer which will account for the different types and degrees of graphitization which have been found at welded joints in both carbon steel and carbon-moly piping. It should be noted that one case of severe graphitization has been found in carbon-moly casting at a welded joint, and one case of moderate graphitization of a low-aluminum carbon-moly pipe. The service temperature in the latter case averaged 975 F with swings to 990 F. One report of segregated bands of graphite in a carbon steel pipe a few inches from a corrugation requires special mention. The particular pipe had been in service some 42,000 hours at an average temperature of 940 F, with about one-half the time above 950 F. While operating conditions were too severe to have much direct application to usual power plant piping the finding of segregated graphite at a location other than adjacent to a weld may prove to be significant.

As the reports were studied, one fact emerged of immediate interest to operating engineers. This is the desirability of limiting the extent and duration of swings above design temperatures. While it is not possible with available information to set definite limits for each material, it would seem wise to keep below the following temperatures insofar as possible until more is known on the subject.

Carbon steel, low and medium carbon	850 F
High-aluminum carbon-moly (1.5 lb. al per ton)	925 F
Low-aluminum carbon-moly (0.5 lb. al per ton)	950 F
Carbon-moly castings	950 F

There is no proof that some graphite will not result under such restrictions, but likewise there is no indication that the serious type of segregated grain boundary graphitization will result if operating temperatures do not exceed the temperatures given above.

In order to emphasize the importance of limiting temperature swings and the value of temperature-duration data in correlating graphitization with operating conditions, the following comparison for two boilers supplying a common turbine is given:

Comparison of Temperature-Duration Data and Graphitization at Welded Joints

	Boiler 1	*Boiler 2*
Total service hours	44,137	43,278
Hours at 1000 F	4½	¼
Hours at 990 F	7	½
Hours at 980 F	31	¾
Hours at 970 F	92	2¾
Hours at 960 F	286	4½
Hours at 950 F	878	52
Total hours at 950F and above	1298	61
Results	Six joints graphitized, one cast C-Mo valve end of segregated type requiring replacement of valve.	No graphite at joints.

The foregoing comparison indicates that a difference of approximately 1240 hours at 950 F and higher may have been a deciding factor in the observed graphitization of this high-aluminum variety of carbon-moly pipe and of a carbon-moly casting. So far, the carbon-moly valve end noted above is the only instance of graphite being found in a casting.

In addition to the work at Battelle, some fifteen other laboratories are making investigations on various phases of the problem. Papers based on the work of three of these laboratories were presented before the ASME at the annual meeting in December, 1943. In two of these papers the suggestion was made that stress relieving a welded carbon-moly joint by heating at 1300 F for about four hours seemed to prevent subsequent graphitization. This finding will, of course, be carefully checked at Battelle and at the other laboratories by more prolonged tests.

It seems reasonably certain that all users of high-temperature equipment are sufficiently aware of the possibility of deterioration adjacent to welded joints and that those most likely to find graphite have investigated by this time. However, until the causes of graphite formation and the possibilities of its segregating are better understood, several companies which have found graphite will continue to sample joints at regular intervals and plan to investigate some other parts of their piping which may have been subjected to unusual or drastic localized heating and cooling operations without subsequent normalizing or annealing treatment. Subsequent progress reports will be issued from time to time as the investigation progresses.

Depreciation Accounting

(*Continued from page* 121)

ever found, should not be reduced by more than the loss which has in fact taken place in the property.

An inadequate or excessive reserve does not affect value any more than would inadequate or excessive fire insurance coverage. When the fire comes, errors in managerial judgment will be shown up; but until then there is no loss of value but only of security, no matter how great chances the management may be taking relative to proper advance preparation or coverage.

The provision for an adequate depreciation reserve in the plan proposed is outlined in Section II.

XI—CONCLUSION

Let us remember that Depreciation Accounting is not a complex scientific problem. It is nothing more than the provision of an orderly method by which the consumer pays for labor and material in the form of plant facilities consumed in his service, exactly the same as he pays for labor and supplies consumed in the production of the product for his service; except that the consuming process in the former is slow and irregular and the complete transaction cannot be recorded within a single accounting period.

In order to effect substantial uniformity of charge in each accounting period, payments are necessarily made in advance of the destruction of the facilities; and such advance payments must be held inviolate for their intended purpose—when the destruction or deterioration of facilities shall, in fact, have taken place.

Let us not create unjustifiable complexity by confusing the question with that of rate base, values, service lives, acquisition costs or other digressions from the simple problem.

PERSONALS

LEONARD J. MOORE, for 13 years executive engineer of the San Joaquin power division of the Pacific Gas & Electric Co., has retired because of illness, according to an announcement by A. Emory Wishon, vice-president and general manager of Pacific Gas. Mr. Moore was with the company 33 years. He is a fellow of the American Institute of Electrical Engineers.

R. E. FISHER, vice-president in charge of public relations and sales for Pacific Gas & Electric Co., was recently named Coastal Area District chairman of the Committee for Economic Development.

Announcement has been made of the appointment of R. W. OSTERHOLM to the position of industrial agent in the general office industrial department of the Ohio Power Co. with headquarters at Canton, Ohio.

Mr. Osterholm's first association with the Ohio utility dates back to 1924 when he entered the company as a part-time draftsman in the Tiffin, Ohio, substation department. At this time he was attending Heidelberg College and from there went to Case School of Applied Science in Cleveland, Ohio, from which he was graduated in 1928.

In that year he joined the Ohio Power Co.'s general office engineering department as a substation engineer where he remained until 1931. He then became an industrial department representative at Tiffin. Between 1934 and 1937, he served as an industrial power engineer with that company in Bucyrus and Fostoria, Ohio, becoming northern division industrial manager at Tiffin in 1937. In 1942 he was appointed industrial manager of the Canton division and held that position until his recent appointment as industrial agent.

MERLE RAINEY, statistician of the Edison Electric Institute, and its predecessor, the National Electric Light Association, for the past 17 years, resigned in March to return to the management of his farm properties in Nebraska. Although Mr. Rainey had long contemplated a return to the Middle West, this move was precipitated by the absence from Nebraska of his brother who is in military service.

A graduate of the University of Nebraska, and trained in the statistical department of Commonwealth Edison Company, Chicago, Mr. Rainey came to the N.E.L.A. in April, 1927, and organized the first systematic collection of statistics of the electric light and power industry. These statistics have been published weekly, monthly and annually ever since. They have been widely recognized and used as authoritative data on the electric industry, not only by the industry itself but by government agencies, the daily press and by various business and economic agencies and publications.

Mr. Rainey also served during the past few years as secretary of the EEI Accounting Executive Committee, and was active as a member of the Public Utilities Subcommittee of the Advisory Committee on Government Questionnaires.

FRANK J. MEISTRELL, secretary of the Union Electric Co. of Missouri since 1940, has resigned to become associated with the New York law firm of Donovan, Leisure, Newton & Lumbard, with which he was formerly connected. Mr. Meistrell is a graduate of Princeton University and received a law degree from Harvard. EUGENE SHAPIRO, assistant secretary, has been named acting secretary of the company.

M. C. HANCOCK, a veteran of 34 years with the Washington Gas & Electric Co., has been appointed superintendent of the company's distribution system in Tacoma to succeed the late Joseph H. Harris. Prior to his appointment to the Tacoma position, Mr. Hancock had been manager of the Gray Harbor branch.

To help utilities in Iowa provide additional employment in the post-war era, the Iowa Utilities Association has recently formed a post-war planning committee headed by L. L. PERRY of the Interstate Power Co. and assisted by co-chairman G. V. LONNECKER of Iowa Public Service Co. and H. D. Makeever, Peoples' Gas & Electric Co.

The full committee of 25 met at Des Moines, Iowa, recently and decided to hold a two-day post-war sales conference at Des Moines on June 19-20. Program plans will be announced later.

Other members of the committee are: R. Ingham and M. L. Nolan of Central States Electric Co.; E. G. Nichols, J. P. Walters and H. G. Mead of Iowa Electric Light & Power; E. F. Miller and J. M. Hollingsworth of Iowa-Illinois Gas & Electric; J. Schilling, J. F. McLaughlin and H. Reeves of Iowa Power & Light Co.; D. Raymond, V. Myers and C. A. Nordstrom of Iowa Public Service Co.; G. T. Perrine and V. C. Price of Iowa Southern Utilities Co.; E. M. Ruede of Nebraska Power Co.; L. G. Johns, Central States Power & Light Co.; M. A. Harpster and H. J. Reiber of Peoples' Gas & Electric Co.; P. Naney and C. A. Hummel, Interstate Power Co.; and W. R. Blake of Iowa Utilities Association.

H. H. PEARSON has been appointed industrial power representative of the southeast division of the Alabama Power Co. on a full time basis. This work was formerly handled by the division superintendent in connection with his other duties. Mr. Pearson was formerly meter superintendent of the southeast division. He joined Alabama Power in 1925.

WILLIAM M. HICKEY has been elected a director of the Niagara Hudson Power Corp. Mr. Hickey is president and a director of the United Corp.

W. P. SHAFFER has been appointed district manager of the Southern California Edison Co., at Pasadena, succeeding C. M. CAMPBELL, who will be Santa Monica district manager.

DORSEY R. SMITH, manager of merchandising and domestic gas and electric sales of the Consolidated Gas, Electric Light & Power Co., Baltimore, Md., has retired after 40 years of service. He has been succeeded by CHESTER S. STACKPOLE, who has been assistant manager since 1928.

LAMONTE J. BRUNDIGE, sales manager of the Sacramento (Calif.) division of Pacific Gas & Electric Co. since 1928, has been appointed manager of the company's De Sabla Division with headquarters at Chico, Calif., according to A. Emory Wishon, P. G. & E. vice-president and general manager. He succeeds the late J. H. Fagg. Two other promotions, occasioned by the transfer of Mr. Brundige to Chico, were made public. W. R. BOWLER, sales manager at Chico, will become sales manager of the Sacramento Division. W. L. GREER, sales supervisor of the San Jose Division, is promoted to be sales manager of the De Sabla Division, succeeding Mr. Bowler.

The American Way

(*Continued from page 99*)

man who is asking special favors and subsidies and tax-exemptions or who is helping to promote those kinds of activities that he is not planning for a return to a prosperous America.

Our two big jobs in postwar planning are: *First,* to determine for ourselves and make known to others the truth as to where we now are. We must know where we are in order to plan how to get where we want to go. We will first have to quit "kidding" ourselves about some mere automatic "swing of the pendulum" carrying us out of this mess of paternalism and vested interest in Government largess in which we are now involved. *Second,* we must give precedence in planning to those plans which will reconstruct the foundations of a free society such as: strict limitation upon the powers of government; a revival of self-reliance and individual responsibility; renewed emphasis upon the importance of the home and family unit; restoration of the right of a man to choose how he shall spend what he earns; relief of the competent from carrying all the burdens of the incompetent; and a fair chance to all, with no "alliances" between government and any favored group. These plans may be considered politically impractical but the old cycle of revolution (inflation, crushing taxation, violence, a dictatorship) is still more impractical.

I have presented some random thoughts on the subject: "The American Way is Not the Easy Way." I hope I have demonstrated that it isn't the Easy Way, and that I do not need to demonstrate it is nevertheless still the *best* way —the best way for everyone, rich and poor, competent and incompetent alike, which has ever been known.

We are not downhearted. We do not believe that the future is all dark or that the outlook is hopeless. But at the same time, we believe that the role of business is a role of leadership in the field of facts as they affect business enterprise; and that if the average American is told the facts, told them plainly and by people in whom he has confidence, he will accept those facts even if they are not as pleasant as some of the fairy stories coming out of the rather grim fairyland in which he has been living.

There's a terrific challenge in the big job ahead! Let's quit kidding ourselves and those who have a right to look to us for leadership.

No problem is too big for a people who are not afraid either to face facts or to follow the laws of God in dealing with those facts. Again, let us face the fact that there is no short-cut, no easy way for a great nation to redeem itself after years of indulgence in economic blunders on the grand scale. Let each of us first look to our own thinking and let each enjoin himself to "sin no more." That is as near to a magic formula for redemption and recovery as we are likely to come. Let's rediscover and insist again on following the American way—the hard way of self-reliance—but the happiest way man has ever found.

CONVENTIONS AND MEETINGS

APRIL

3-5	American Society of Mechanical Engineers, Spring Meeting, Birmingham, Ala.
3-5	Eleventh Annual Commercial Meetings, EEI, Edgewater Beach Hotel, Chicago, Ill.
6-7	Missouri Valley Electric Association, Engineering Conference, Continental Hotel, Kansas City, Mo.
12	Electric Companies Advertising Program, Management Group, New York, N. Y.
13-14	Midwest Power Conference, Palmer House, Chicago, Ill.
19-20	Missouri Association of Public Utilities, Annual Business Meeting, Jefferson Hotel, St. Louis, Mo.
19-22	National Electrical Wholesalers, Second War Conference, Stevens Hotel, Chicago, Ill.
23-27	National Electrical Manufacturers Association, Chicago, Ill.
25-27	Gas and Electric Industry Accounting Conference, Hotel Cleveland, Cleveland, Ohio.
27	Electric Companies Advertising Program, Copy Group, New York, N. Y.

MAY

1-2	Electrical Equipment Committee, EEI, Edgewater Beach Hotel, Chicago, Ill.
1-2	Prime Movers Committee, EEI, Edgewater Beach Hotel, Chicago, Ill.
1-2	Transmission and Distribution Committee, EEI, Edgewater Beach Hotel, Chicago, Ill.
4-5	Accident Prevention Committee, EEI, Edgewater Beach Hotel, Chicago, Ill.
8-11	National Fire Protection Association, Benjamin Franklin Hotel, Philadelphia, Pa.
15-16	Arkansas Utilities Association, Marion Hotel, Little Rock, Ark.

JUNE

6-7	EDISON ELECTRIC INSTITUTE, Annual Conference, Waldorf-Astoria Hotel, New York, N. Y.
5-7	Public Utility Advertising Association, Chicago, Ill.
19-20	Iowa Utilities Association, Post-War Planning Conference, Des Moines, Iowa.
19-22	The American Society of Mechanical Engineers, Semi-Annual Meeting, Pittsburgh, Pa.
22-23	Canadian Electrical Association, Annual Meeting, Murray Bay, Que., Can.

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As a service to EEI member companies the set of six 16-inch transcription platters is offered at the cost of impression—$16.50 per set, plus shipping charge. Scripts of the complete series are available for the asking.

Comments of hard-boiled, public-relations-minded utility executives who have heard them range from approval to unadulterated enthusiasm.

After hearing the first program, some companies that originally planned to use them on their regular morning program time have contracted for choice evening spots to get wider audience coverage.

These transcriptions may also be played on an ordinary sound-slide projector — for employee and other group meetings and *for you to check the programs in advance.*

NOTE: These are the "War of Enterprise" radio programs produced jointly by the Edison Electric Institute and the U. S. Chamber of Commerce. Further information available from

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J. V. TONER.....Boston Edison Company, Boston, Mass.